# MAHARASHTRA STATE
# GAZETTEERS

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# MAHARASHTRA STATE GAZETTEERS

सत्यमेव जयते

Government of Maharashtra

## GENERAL SERIES VOLUME A

# BOTANY

(REVISED EDITION)

## PART III—MISCELLANEOUS PLANTS

1961
DIRECTORATE OF GOVERNMENT PRINTING, STATIONERY
AND PUBLICATIONS, MAHARASHTRA STATE
BOMBAY

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FIRST EDITION : 1886
SECOND EDITION (Revised) : 1961

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# PREFACE.

Volume XXV of the "Gazetteer of Bombay Presidency" was devoted to Botany and was published in 1886. It contained three articles, *viz.* :—

(1) Useful Plants of the Bombay Presidency—by J. C. Lisboa;

(2) Botany of the Bombay Presidency—by Surgeon Major W. Grey; and

(3) List of Gujarat Trees, compiled from materials supplied by G. H. D. Wilson and Lt.-Col. J. C. McRæ. In this revised edition, the information given in all these articles has been brought up-to-date; articles (1) and (3) have been recast and arranged into three Parts, *viz.*, I—Medicinal Plants, II—Timbers, and III—Miscellaneous Plants, Trees, Shrubs, Herbs, etc.; and article (2) has been entirely re-written under the heading "Vegetation of the Maharashtra State" and arranged as Part IV.

Dr. S. P. Agharkar, M.A., Ph.D., F.L.S., F.N.I., Professor of Botany (Retired), Calcutta University, was in charge of the preparation of these parts under the direction of the District Gazetteers (Revision), Editorial Board. Unfortunately he did not live to complete so valuable a work. He prepared the third part under great physical handicaps. When the manuscript was in the press, he passed away on the 2nd September 1960.

Part I medicinal plants was published in 1953. Part II Timbers was published in 1957. This Part, which deals with Miscellaneous Plants—Trees, Shrubs, Herbs, etc., is also being published separately for the convenience of the public.

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P. SETU MADHAVA RAO,
Executive Editor and Secretary,
Maharashtra District Gazetteers (Revision)
Editorial Board.

January 1961.

# BOTANY.

## PART III–MISCELLANEOUS PLANTS.

## SECTION I–FIBRE–PLANTS.

### ABELMOSCHUS ESCULENTUS Linn.

### (HIBISCUS ESCULENTUS Linn).

FAM.–Malvaceæ.

SECTION 1.
—
Fibre Plants.

COM. NS. :–*E.* Gabba, Gumbo, Lady's finger, Ochra ; *G.* Bhinda ; *H.* Bhindi. Katavandai, Ramturai ; *K.* Bendikai, Bende ; *M.* Bhendi ; *Sk.* Bhinda, Gandhamula, Pichhila, Tindisa, Krittabija.

DISTR. :–Cultivated throughout India ; probably of African origin ; naturalised or cultivated in all tropical countries.

FIBRE :–The bast yields a strong useful fibre of a white colour, long and silky, generally strong and pliant, and composed of very fine individual fibres. It is undoubtedly valuable and seems to possess qualities especially fitting it for the purpose of paper-making. The plant is largely grown for its fruit which is used as a vegetable. The excellence of the fibre seems to be not recognised.

*See*–Vegetables.

### ABELMOSCHUS MOSCHATUS Medik.

### (HIBISCUS ABELMOSCHUS Linn.)

FAM.–Malvaceæ.

COM. NS. :–*E.* Musk-Mallow ; *G.* Mushakdana ; *H.* Mushakadana ; *K.* Kasturibende ; *M.* Dasturibhendi ; *Sk.* Lalakasturika.

CHAR. :–A tall annual shrub ; stem clothed with long hairs ; *L.*–polymorphous, cordate, the lower ovate, acute or roundish anglod, upper palmately 3·7 lobed, lobes oblong-ovate, crenate, serrate or irregularly toothed, hairy ; *Fl.*–regular, bisexual, involucral bracts 8-12, hairy, yellow with purple centre ; *Fr.*–capsule fulvous hairy, oblong-lanceolate, acute ; *Sd.*–subreniform, blackish ; *Fl. t.*–cold season.

DISTR. :–Cultivated in the hotter parts of India ; tropics of the old-world.

FIBRE :–Stem yields an excellent strong fibre used for cordage. is compared with jute it is inferior.

*See*–Oils.

### ABROMA AUGUSTA Linn.

FAM.—Sterculiaceæ.

COM. NS. :—*E.* Devil's cotton ; *H.* Kumal, Ultkambal ; *K.* Melpundigida ; *M.* Ulatkambal, Olak-tambol.

CHAR. :—A shrub or a small tree with velvety branches ; *L.*—10-15 × 12 cm., rapand, denticulate, entire, smooth above, pubescent below ; *Fl.*—dark-red, 5 cm., diam ; *Fr.*—capsule, 4 cm., long, obpyramidal ; *Sd.*—enveloped in light cottony wool.

DISTR. :—Indigenous or cultivated throughout the hotter parts of India (Sikkim ; Khasia Hills, Assam), Java, Philippines, China.

FIBRE :—The bark of the twigs yields a valuable fibre. The fibre is separated by retting the bark in water for three to four days. It is pale yellow in colour, soft and glossy. It resembles jute in chemical behaviour and composition. It might be used with advantage as a substitute for silk. Roxburgh says of this plant : "The bark abounds with strong, white fibre, which makes a very good substitute for hemp, and the plant grows so quickly as to yield two, three or even four crops of cuttings annually fit for peeling ; it may be with advantage cultivated for its fibre." It is perennial, more easily cultivated than jute or sann and the fibre is easily separated.

### ABUTILON INDICUM Sweet.

FAM.—Malvaceæ.

COM. NS. :—*H.* Kanghi ; *K.* Tutti ; *M.* Mudra, Petari.

CHAR. :—A hoary tomentose herb. *L.*—heart-shaped, toothed, rarely trilobate. *Fl.*—yellow, opening in the evening. *Fr.*—top-shaped, pointed, hairy, dark-brown.

DISTR. :—Very common, especially in the Deccan, where it is abundant along road-sides ; Konkan ; S. M. Country.

FIBRE :—Stems on retting yield a fairly good fibre suitable for cordage. It is used for domestic purposes, but does not enter into commerce. This is one of the fibres which can be used as a substitute for jute. *Abutilon* has proved successful in recent years as a ratoon crop and its cultivation is to be extended.

### ABUTILON MUTICUM Sweet.

FAM.—Malvaceæ.

COM. NS. :—*M.* Kasili, Karandi.

CHAR. :—A hairy undershrub. *L.*—heart-shaped, roundish, velvety on both surfaces. *Fl.*—orange-yellow, *Fr.*—globose, silky, depressed at the top.

DISTR. :—Widely distributed throughout the State, growing on rubbish heaps and along road-sides in Konkan, and Deccan.

FIBRE :—Stem yields a good fibre.

*See*—Famine Plants.

## ACACIA ARABICA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Babul ; Indian Gum Arabic ; *H.* Babul, Babus ; *K.* Gobli, Jali, Jaligida ; *M.* Babhul, Babul ; *Tr.* Babul.

CHAR. :—A moderate-sized or a large tree. Bark dark-brown or black, longitudinally fissured. Branches thorny. Spines 6-5 cm. long, large, white, often with brown points, straight, somewhat ascending. *L.*—rachis downy with several cup-shaped glands ; pinnæ generally 6-12, 1·3-4 cm. long ; leaflets 20-40, linear, membranous, ·6 cm., glabrous or downy. *Fl.*—yellow, in globose heads. Peduncles slender, grey-downy, with bracts in the middle, 3-6 fasciculate. Corolla campanulate, twice the length of the salyx. *Fr.*—pod, coriaceous, densely grey-downy, stalked, 7·5-10 cm. ×1·3 cm. moniliform, 8-12 seeded. *Fl. t.*—June-Jan. (rainy season). *Fr. t.*—cold season.

There are two varieties. *Var.—cupressiformis* Stew—branches erect like a cypress in growth, called *Ram-Kanta. Var.—Vediana* bark more deeply cracked, crown formed of twisted angular branches ; spine white ; stout ; pods flat, called *Vedi-babul.*

FIBRE :—Bark of the slender twigs yields fibre, some-times used for coarse ropes.

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins, Fodder Plants.

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## ACACIA LATRONUM Willd.

FAM.—Mimosaceæ.

COM. NS. :—*H.* ; Bhes ; *K.* Donn-mullin, Hod-Jali, Tumbuli *M.* Bhes, Dev-Babhul.

CHAR. :—A glabrous shrub or a small tree, forming an umbrella like crown when old, armed with twin straight, white, stipular spines, connate at the base, ·6-6·5 cm. long. *Bark* dark reddish-brown, very rough, 1·3 cm. thick, vertically cleft. *L.*—often very close with a gland on the glabrous or (sometimes) pubescent petiole. Pinnæ 6-10, 2·5 cm., leaflets 20-30, ligulate, glabrous or pubescent, rigid. *Fl.*—frangrant, white, becoming yellow in time, in spikes 2·5-4 cm., arising from the leafless branchlets. Corolla very small. *Fr.*—pod, 1·3-5 × 1·3-2 cm., dehiscent, falcate, dark-brown, 2-4 seeded. *Fl. t.*—Jan.-Mar.

DISTR. :—Common in the dry plains and barren tracts of the Deccan (especially eastern part), Western Peninsula and S. India.

FIBRE :—It is said to yield a good fibre from bark.

## ACACIA LEUCOPHLEA Willd.

FAM.—Mimosaceæ.

**SECTION I.**
—
**Fibre Plants.**

COM. NS. :—*E.* White-barked Acacia; *G.* Haribaval; *H.* Thind, Karir, Nimber, Safed-kika; *K.* Bili-jali, Naibela, Topal; *M.* Hivar.

CHAR. :—A moderate-sized or large deciduous tree. 7·5-15 m. high, girth 1·2-1·8 m. In dry places is reduced to a small bushy tree. *Bark* thick, pale yellowish-white and smooth when young; dark-brown, almost black and rough when old; exfoliating in patches of inflorescence grey-downy. *Spines* ·6-2-5 cm., stipular, straight. Petiole with several cup-shaped glands. *L.*—Pinnæ 12-24, 2·5-4 cm. long; leaflets 30-60, rigid, coriaceous, obliquely oblong obtuse. *Fl.*—small, pale-yellowish, nearly white, in globose heads, not more than ·6 cm. diam., disposed in terminal leafless; about 30 cm., long panicles; peduncles short with two bracts. *Fr.*—pod, 10-20 × ·6-·8 cm., sessile, slightly twisted, clothed with pale-brown or grey tomentum. Seeds 8-12. *Fl. t.*—Aug.-Nov., (sometimes as early as May). *Fr. t.*—Nov.-Apr.

DISTR. :—Throughout the dry Deccan districts; common in the S. M. Country and Sholapur, in dry open forests, plains of the Punjab and U. Pradesh: Ceylon and Burma.

FIBRE :—A coarse tough fibre is prepared from the bast by steeping it in water and beating; much valued for fishing nets and coarse cordage.

*See*—Gums and Resins, Famine Plants, Dyes and Tans.

## ADANSONIA DIGITATA Linn.

FAM.—Bombacaceæ.

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COM. NS. :—*E.* African Galabash, Baobab, Monkey-bread-tree of Africa; *G.* Bukha, Gorakheer, Goruk Amla; *K.* Brahmamlika; *M.* Gorakh Chinch.

CHAR. :—A tree with a very thick trunk at the base but soon tapering like a cone, sometimes 18-21 m. high, 9 m. in diameter. *L.*—digitate, glabrous, pubescent beneath when young, deciduous; leaflets generally 13-18·2 × 7·8-10·4 cm., long-obovate or oblong-lanceolate, acuminate, attenuated at the base, entire or sinuous at the margins. *Fl.*—white, solitary, axillary, pedulous, long-peduncled (often more than ·3 m.). Calyx thick, coriaceous, fleshy, cup-shaped, 5—cleft, tomentose externally and clothed with silky hairs internally. Petals obovate, adnate below to the stamens. Staminal tube thick, dividing alove into numerous filaments; anthers long, linear, reniform or contorted, 1-celled. Ovary ovoid. Style long, filiform, divided at the summit into as many radiating stigmas as there are cells to the ovary. *Fr.*—pendulous, oblong, downy, woody, indehiscent, long. Seeds kidney-shaped, brown, immersed in a mealy, slightly acid substance. *Fl. t.*—May-June. Sheds leaves in dry season; new foliage in Apr.-June.

DISTR. :—Native of Africa; cultivated in all parts of India, Dharwar, Gujarat, Hyderabad, Madhya Bharat, Bengal, Ceylon. Supposed to have been introduced by Arabs.

FIBRE :—The inner-bark yields a strong useful fibre. In Senegal it is made into ropes and woven into cloth. Small trees yield finner and softer fibre than large ones. In Africa the fibre is used for making ropes, twines and sacking. In India elephant saddles are made from it. It produces an exceedingly strong fibre suitable for bank notes and has received much attention (Spon's Encyclopedia). Paper of better quality is made from pulp obtained from the inner bark. The pulp is dark greenish-brown but does not bleach well. It yields strong opaque wrapping paper.

*See*—Medicinal Plants.

## ÆSCHYNOMENE ASPERA Linn.

FAM.—Papilionaceæ.

CHAR. :—An erect perennial large shrub; stem pithlike, often horizontal below and floating, then erect, full of light, spongy white pith. *L.*—imparipinnate. *Pods* woody.

DISTR. :—A swamp species; not very common in Bombay State. S. M. Countary, Kanara, Bengal, Assam: Burma, Malay Isles, tropical Africa.

FIBRE :—Bark yields fibre.

## AGAVE LURIDA Ait.

FAM.—Amaryllidaceæ.

COM. NS. :—*E.* The Blue-elephant aloe, *M.* Latia ghayal.

CHAR. :—*L.*—linear-oblong, many from a short trunk, sagegreen, often greyish-blue; ends more or less recurved or drooping; marginal prickles broad, stout, black, spreading or decurved; terminal spine shortly channelled, dark-brown.

DISTR. :—Common throughout the State more particularly so towards the south; usually used as fence along the fields and railway tracks; also found in clumps near villages.

FIBRE :—The leaves yield 1·5-2·5 % of fibre. It is coarser and stronger than that of *A. vivipara* (Cantala fibre).

## AGAVE RIGIDA Mill.

FAM.—Amaryllidaceæ.

COM. NS. :—*E.* Sisal Hemp; *G.* Jangali Kunwar; *H.* Rakas Pattak; *K.* Bhuttale; *M.* Ghayal, Ghaypat.

SECTION 1.
Fibre Plants.

CHAR. :—*L.*—oblong-lanceolate, thick, fleshy, rigid, never forming a rosette, but closely tufted on the rhizone, the inner making a very sharp angle with the axis, the outer gradually receding, colour deep green, margins with or without prickles, which if present are week, scattered and pale-coloured; terminal spine not channelled, glossy purple or dark-brown.

DISTR. :—Introduced into India between 1885-1892; cultivated in the districts of Nasik, Ahmednagar, Poona, and Satara.

FIBRE :—The yield of fibre is 3% in wet and 4% in dry climates. 1,000 leaves yield about 60-80 lbs. of dry fibre.

### AGAVE VIVIPARA Linn.

FAM.—Amaryllidaceæ.

COM. NS. :—*G.* Kunwar; *K.* Kalnaru; *M.* Ghayal, Ghaypat.

CHAR. :—*L.*—linear lanceolate; in a lax but even tuft from a short ascending root-stock; pale-green; older very narrow in proportion to their length, curving gradually or almost bent; marginal prickles always ascending; terminal spine cylindrical reddish or dark-brown.

DISTR. :—Common all over the State. Often cultivated over large areas; also along canal embankments, fields and gardens. A native of Central America, Mexico. Introduced in India in the 16th Century. Not known in the wild condition.

FIBRE :—Leaves yield a good fibre.

### AGAVE WIGHTII Drum & Prain.

FAM.—Amaryllidaceæ.

COM. NS. :—*M.* Chota Ghayal.

CHAR. :—*L.*—ensiform linear lanceolate, short, inserted in a compact series on a stout trunk, forming a stiff, even, rosette; pale-green, ofted tinged with ashy-grey; marginal prickles weak, usually consisting of a small brown cushion with a garnet coloured spine, sharply recurved, ending in a finely barbed hook, pointing upwards; terminal spine pale, slightly decurrent.

DISTR. :—Common throughout the greater part of the State along fields, road-sides, gardens; probably the hardiest species.

FIBRE :—The fibre is of the same type as other species, but is short.

### SISAL (Agave species).

Agave is a large benus of short stemmed, half-woody plants bearing rosettes of long, erect, pointed, fleshy leaves, The plant belongs to the hard fibre group.

There are many species of agave from indigenous to Tropical America from where they have been introduced into other tropical countries such as the Philippines, Java, Cuba, East-Africa, etc. Agaves were introduced in India by the Portugese in the fifteenth century, and they are now completely naturalized throughout the country.

*Agave vivipara* L. *A. rigida* Mill, *A. lurida Ait.* and *A. wightii* Drum and Prain., occur in India. They are found planted along roadsides, as a fence along cultivated fields and railway embankments. There are also regular plantations, on small scale in the country.

The above four species of sisal are more or less common in the Bombay State. Out of these *A. vivipara, A. rigida* are to a certain extent, and can be used commercially for fibre. There is only one large estate worth-mentioning—called Ghaipat-Wadi—near Shrigonda in the Ahmednagar District.

The most important districts growing Agaves are Thana, Nasik, Poona, Ahmednagar, Satara, Belgaum and Dharwar.

Agaves are propogated by suckers and bulbils. Leaves are ready for extracting fibre when they are sufficiently mature that is when the plants are about four years old. They are cut twice in the year (April and October) and if the crop is good even thrice a year. On an average, a plant produces 20 to 25 mature leaves per year, till the 7th or 8th year of the plant when the plantation requires renovation. The number of leaves obtained during the life-time of the plant varies from 150-200 or sometimes over 250.

After harvest the fibres is extracted, normally, by retting in water. In this process the cut leaves are slit lengthwise into thin strips and dried in the sun for a few days. They are then tied in bundles; these bundles are submerged in water for 5 to 6 days. By this time the pithy matter disintegrates due to bacterial action leaving the fibres free. They are then washed, dried and cleaned by removing as much pithy matter as possible by beating on rocks. On large estates the fibre is extracted by machine called Raspador. This machine consists chiefly of a revolving drum mounted on an axle, with blunt blades fitted obliquely on the outside of the drum wall. Decortication is effected by rasping of the leaves by the blades. The extracted fibre is soaked in water for 5 to 10 minutes, so that all the green substance of the bast adhering to the fibres is removed. It is then beaten on a stone with mallet, washed and spread out on ground or hung up on poles for drying. When dry, the fibre is combed. This removes any pithy matter remaining on the fibres, separates short fibers, which are collected as tow, and gives lustre to the fibre. The fibre obtained is about 3 to 4 per cent. of the total weight of leaves.

The yield of finished fibre is abount 720 lbs. per acre. In the Bombay State 30 acres may be taken as an economic unit large enough to keep one raspodor, busy for 7 to 8 months, during a year, for extraction of fibre.

The colour of the fibre ranges from white and light-yellowish to reddish or reddish-brown. It is rather coarse, strong and durable. Machine decorticated fibre is stronger, cleaner and lustrous.

Agave fibre is one of the important commercial hard fibres. It ranks next to cotton in U.S.A. The fibre is mainly used for manufacturing ropes, twines and cordage. It is eminently suited for cordage of all kinds and trials carried out at the Imperial Institute, London, in co-operation with the admiralty have proved that for marine cordage this fibre compares favourably in durability with Manila hemp (*Musa textilis*). In recent years it has also been used for coarse fabrics. It is commonly used for binders, twine, door-mats, rugs, carpets and fishing nets. There are some additional uses of sisal fibre and tow, namely for automobile pads, for summer rugs, for upholstery, for making paper and paper-boards and for numerous novelties. In the United States, since 1944, the successful development of an automatic hay-baler requiring a coarse sisal twine for tying the bales has opened a new and very large field for sisal fibre. Recently a new use has been found in the Bombay State for sisal in hand-made *bardan* (loose netted cover for transporting cotton to the market).At present the bardan making is restricted to Karnatak. There are about 32,00,000 acres under cotton in whole of the Bombay State. As the available sisal is inadequate to meet the demand, plantations, have to be established on the cultarable waste lands which amounts to several thousands of acres in the Bombay State alone. There is a world wide demand for the fibre since sisal heads the world production amongst all cordage fibres.

In India there are few plantations, which have long been established. Mexico had practically a monopoly of sisal production up to the first decade of the twenteeth century. Now there are large plantations in Java, British East Africa, Portugese East and West Africa and Cuba where business is undertaken on a very large scale.

### ANANAS SATIVUS Schult.

FAM.—Bromeliaceæ.

COM. NS. :—*E.* Ananas, Pine-apple; *G.* Ananas; *H.* Ananas; *K.* Ananas hannu; *M.* Ananas; *Sk.* Ama, Ananasa, Kantak sanjika, Parvati.

CHAR. :—It is a herbaceous perrenial, introduced into India from South America—its native home. The fruit is juicy and has a good flavour.

DISTR. :—Cultivated in India and elsewhere in tropical countries, native of Brazil, (tropical America).

FIBRE :—Leaves yield good fibre. Two-year old leaves are cut for fibre. They are steeped in water for nearly 18 days. The fibre is beautiful, strong and does not rot; but for the difficulty of extraction it would be largely used. It is used for threading necklaces.

Both the cultivated and wild pine-apple yield fibres which, when spun, surpass, in strength, fineness and luster, those obtained from flax. It can be employed as a substitute for silk and as a material for mixing with wool or cotton. For sewing thread, twist, trimmings, laces, curtains and the like, its particular qualities render it specially applicable. Twines, cords and fishing nets are also sometimes made of it. Pine-apple ropes are said to bear constant immersion in water. The waste material left during the extraction of fibre is suited for making paper.

In Formosa, Philippines and South China, pine-apple is cultivated for firbe which is being used for textile fabrics.

*See*—Fruits, Medicinal Plants.

### ANODENDRON PANICULATUM A. DC.

FAM.—Apocynaceæ.

COM. NS. :—*M.* Lamtani, Kauli.

CHAR. :—A very large smooth climber with a very thick green stem. *L.*—much polished, oval with sharp points. *Fl.*—small, numerous, pale yellow. *Fr.*—follicles tapering to a blunt point.

DISTR. :—Western Ghats, South Konkan, Deccan Peninsula.

FIBRE :—The stem yields a fine and very strong fibre much used by the Singhalese.

### ANONA RETICULATA Linn.

FAM.—Anonaceæ.

COM. NS. :—*E.* Bullock's heart ; *G.* Ramphal ; *H.* Ramphal, Ramphal.

CHAR. :—A small tree of spreading habit. *L.*—oblong-lanceolate. *Fl.*—greenish in clusters of 2 to 4. *Fr.*—fairly large, almost heart-shaped, yellowish, with muddy tinge when ripe ; pulp white, seeds black.

DISTR. :—Cultivated in gardens all over the State ; also grows wild near watery places in Konkan and Deccan. Native of Tropical America.

FIBRE :—A good fibre is prepared from the bark of young twigs.

*See*—Fruit Trees.

### ANTIARIS TOXICARIA Lesch.

FAM.—Moraceæ.

COM. NS. :—*E.* Upas tree ; *H.* Chandkuda ; *K.* Ajjanpatte, Bairi, Gajbugri ; *M.* Chandala, Chandkuda, Karwat, Jasund.

CHAR. :—A very tall (gigantic), evergreen tree, buttressed at the base, 30-75 m. high; girth enormous sometimes reaching 9 m., Bark dark coloured, hard, smooth. *L.*—10-20 × 5-5·6 cm., petiolate, elliptic-oblong, acuminate, rounded or cordate at the base, entire, scabrous. *Male fl.*—axillary, crowded on a thick, flat receptacle; calyx lobes 4; stamens 3-8. *Female fl.*—solitary, enclosed in an involucre of imbricate bracts. Styles 2. *Fr.*—1·8 ×1·3 cm., 1-seeded, red, velvety. *Fl. t.*—Sept.-Oct. *Fr. t.*—cold season.

DISTR. :—In the evergreen forests of the Konkan and North Kanara, common near Yellapur; Western Peninsula: Burma (Pegu, Tenna-serim), Ceylon, Malay Peninsula.

FIBRE :—The inner bark yields a strong fibre. The large cylindrical pieces of the bark are stripped, soaked in water and beaten till the fibre separates in the form of white felt. In South India, it is used to make sacs. Fibre is also considered good for cordage and matting. In Borneo and Malaya, a kind of cloth is made out of the bark, but this fabric proves injurious to the body because the adhering latex acts on the skin. The large fibrous strippings are sewn up, one end and side, and a complete bag is obtained ready for use.

*See*—Gums & Resins, Medicinal Plants.

### ARECA CATECHU Linn.

FAM.—Palmeæ.

COM. NS. :—*E.* Areca-or Areca-nut-palm, Betel-nut Tree; *G.* Hopari, Sopari; *H.* Supari, Suppiyari; *K.* Adki, Betta, Chikna, Kaungu, Poga; *M.* Pophal, Supari.

CHAR. :—A tall tree; stem quite straight, cylindrical, grey, annulate, the inner part generally hollow; 12-30 m. high; girth 20 cm., *L.*—pinnate, 1·2-1·8 m., leaflets numerous, 30-60 cm., upper confluent. Spathe double, compressed. *Fl.*—spadix branched, bearing male and female flowers; rachis stout; male very numerous; corolla petals 3, rigid; female solitary, 2 or 3 at the base of each ramification of the spadix; perianth sepals 3, petals 3, rigid, fleshy cordate. *Fr.*—3·8-5 cm., long, smooth, fleshy-fibrous, orange or scarlet. Seed in the upper part. *Fl. t.*—Mar.-Apr. *Fr. t.*—cold season.

DISTR. :—Cultivated in high rainfall tracts. Extensively grown in North Kanara; fairly largely in the Konkan. Madras, Bengal, Assam, Mysore, Malabar, Indo-Malaya, Malayan Peninsula and Islands, Burma, Siam. Native of Indo-China.

FIBRE :—The nut is covered with a fibrous pericarp which may be used for paper making.

*See*—Medicinal Plants, Fruit trees.

## ARTOCARPUS INTEGRA Merr.

### (ARTOCARPUS INTEGRIFOLIA Linn.)

FAM.—Moraceæ.

**SECTION 1.**
**—**
**Fibre Plants.**

COM. NS. :—*E.* Jack-fruit Tree, Jack or Orange Wood ; *G.* Vanas ; *H.* Chakki, Kanthal, Ranos ; *K.* Halasu, Kujja, Panesa, Tage ; *M.* Phanas ; *Tr.* Jack.

CHAR. :—A large evergreen tree, 12-18 m., high ; girth 1·3-3 m (sometimes more). Glabrous except the youngest parts. Bark thick, blackish, deeply cleft when old. L.—10-20 cm., long, coriaceous, elliptic, entire (in young plants sometimes lobed), dark-green and shining above, rough beneath, stipules large. *Fl.*—monoecious ; densely crowded on globose one-sexual solitary, axillary receptacles ; male receptacle cylindric without bracteoles ; female attaining enormus size, 30-75 cm., tubercled ; hanging on short stalks from the trunk ; anthocarps, pyramidal. Seeds oblong or reniform, starchy, size of a nutmeg. *Fl. t.*—Nov.-Jan. *Fr. t.*—ripe June-Aug.

DISTR. :—Rain forests of Western Ghats, Konkan, often planted along roadsides in North Kanara ; planted near villages in the State ; grown in gardens also ; widely cultivated.

FIBRE :—The bark yields a fibre which can be used for cordage.

*See*—Medicinal Plants, Fruit-trees, Gums and Resins, Fodder Plants, Dyes and Tans.

## ARTOCARPUS LAKOOCHA Roxb.

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FAM.—Moraceæ.

COM. NS. :—*H.* Barhat, Dahu, Dhau, Lakuch ; *K.* Wonta, Watchuli , *M.* Badhar, Wotomba ; Tr. Lakooch.

CHAR. :—A large deciduous tree, 12-18 m. high ; 1-8-3 m., Bark rather thick, dark grey, rough. Branchlets and under-side of leaves downy. *L.*—15-25 × 5-15 cm., oval or ovate or oblong-ovate, obtuse or short-acuminate, coriaceous, glabrous and shining above and soft tomentose below. *Fl.*—Aments of both sexes on very short paduncles, axillary and solitary, the male generally on the lower exils, irregularly roundish or oblong, yellow, size of a nutmeg ; female on the upper axils. *Fr.*—size of a man's fist, sometimes larger, soft-pubescent, yellow when ripe. *Fl. t.*—Mar.-Apr. *Fr. t.*—July-Aug.

DISTR. :—Evergreen forests of the Konkan and North Kanara, common in the forests near Yellapur ; tropical Himalayas from Kumaon eastwards to Burma and southwards to Travancore.

FIBRE :—The bark is said to yield a fibre used for cordage.

*See*—Fodder Plants. Dyes & Tans.

SECTION 1.

Fibre Plants.

### ARUNDO DONAX Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Great Reed, Spanish-cane ; *H.* Bara-nal, *M.* Devnal

CHAR. :—A tall perennial grass, 1·3-3·6 m. high. *L.*—broader. *Fl.*—in large, long, erect, mixed and ovate panicles.

DISTR. :—Often grown as an ornamental grass in clumps in large gardens or on lawns in the State. Native of lower Himalayas ; the Punjab, Nilgiri ; Europe, and N. Africa.

FIBRE :—The reed is used in South Europe for the manufacture of baskets, mats, etc. The stalks and leaves of cultivated reed yield a pulp of high cellulose content used in Italy for rayon manufacture. *Arundo donax* is one of the most suitable raw materials in India for the manufacture of high grade writing paper (Raitt.).

### ASCLEPIAS CURASSAVICA Linn.

FAM.—Asclepiadaceæ.

COM. NS. :—*E.* West Indian or wild Ipecacuanha ; *M.* Kaktundi, Kuraki.

CHAR. :—An erect undershrub, 0·9-1·2 m. high ; *L.*—opposite 7·5-10 × 1·3-2·5 cm., lanceolate, thin, narrowed at both ends ; *Fl.*—orange in axillary umbels ; *C.*—lobes reflexed in flower, valvate in bud ; corona bright orange of 5 erect processes adnate to the staminal column ; *Fr.*—Follicles, solitary, erect, 7·5 cm. long, straight, tapering at both ends ; *Sd.*—ovoid, dark-brown, with coma ; *Fl. t.*—Feb.-Dec.

DISTR. :—Introduced from the W. Indies ; naturalised in many parts of India.

FIBRE :—The stems yield fine fibre used for textile fibrics in West Indies. It may be used in textiles in combination with cotton.

### BAMBUSA BAMBOS Voss.

### (BAMBUSA ARUNDINACEA Willd.)

FAM.—Gramineæ.

COM. NS. :—*E.* Spiny or Thorny Bamboo ; *G.* Tonear, Wang ; *H.* Bans, Kota, or Magar-or Malbans ; *K.* Bidiru, Gale, Habbidru, Kalale ; *M.* Kalak, Bamboo.

CHAR. :—A tree thorny ; stems many, tufted on a stout root-stock. 24-30 m. high with 15-17·5 cm. in diameter, usually graceful and curving ; nodes prominent (the lowest rooting) ; the lower emitting horizontal, almost naked shoots, armed at the nodes with 2-3 stout recurved spines, sometimes 2·5 cm. or more long ; internodes up to 45 cm. long ; stem-sheath coriaceous, variable in shape, striate, rounded tip and plaited margin; when young orange-yellow streaked with green or red and thinly ciliate with golden hairs. *L.*—up to 13-20 × 2·5 cm., linear or linear lanceolate, margin scabrous, base rounded; leaf-sheath ending in a thick callus; ligule short. *Fl.*—an enormous panicle, branchlets bearing loose clusters of spikelets. *Fl. t.*—after irregular intervals of 30 years or less.

DISTR. :—Along the banks of rivers and *nalas* in moist monsoon forests. Dangs, Konkan, W. Ghats, Deccan and N. Kanara. Throughout India (except the Himalayas), Burma and Ceylon. Often cultivated.

FIBRE :—Bamboo shoots yield fibre, best suited for paper manufacture. It yields paper pulp of good quality. Of all the fibre yielding plants known to Botanical Science, there is not one so well calculated to meet the pressing requirements of the paper trade as 'Bamboos' both as regards facility and economy of production, as well as the quality of the paper-stock, which can be manufactured therefrom. Grown under favourable conditions of climate and soil, there is no plant which will give so heavy a crop of available fibre to the acre, and no plant which requires so little care for its cultivation and continuous production (Mr. Routledge "Bamboos as a paper-making material" 1875.).

## PAPER MAKING.

PAPER MAKING :—The future development of this industry, cheifly depending on the supplies of indigenous raw material would have been faced with serious difficulty had it not been for the investigation of Bomboos carried out at the Forest Research Institute, Dehra Dun, since 1915. These investigations have definitely proved the possibility of utilising bamboos for the manufacture of a large variety of papers.

From very ancient times bamboo was being used for paper manufacture in China. Manufacture of bamboo-pulp on a large scale is a recent development.

The successful utilization of bamboo for paper-making in India is mostly due to the investigation of Raitt. Manufacture of Bamboo pulp was started in 1923 and today bamboo is the most important raw material of the paper industries in India.

Two bamboo species—*Dendrocalamus strictus* .and *Bambusa arundinacea*, which are widely distributed and are available in large quantities, are being exploited for paper-pulp manufacture. For paper manufacture bamboos can be compared to spruce-wood which do not show marked difference in chemical composition.

Bamboo comes intermediate between grasses and coniferous woods as a paper material. Grasses are rich in pectose and woods in lignin.

Mature culms 2-3 year old are used for pulp manufacture as they give maximum amount of cellulose. After cutting, the bamboos are first seasoned in open yards for 6-12 months, when the moisture contents are reduced ; air dry bamboos, yield on an average about 40 % of bleached pulp (about 2·4 tons of bamboo give one ton of pulp.).

The preparation of paper-pulp consists, chiefly, in the removal of cellulose fibres from other compounds, such as, lignin, starch, fat and resin which are found in the raw material. This is effected by reducing them to a smaller size and digesting them with chemicals such as sulphite or alkalis.

The common commercial processes for the digestion of raw materials are (1) The sulphite process, (2) The soda process and (3) The sulphate process. In India, sulphite process is not well suited to the production of bamboo pulp.

Bamboo-pulp is suitable for preparing better grade of printing papers. This paper compares favourably with ordinary, super-calender and printing paper. It is capable of standing considerable wear and tear and retains its whiteness and brilliance for long periods.

Papers containing pure bamboo-pulp have been made without any difficulty. Generally bamboo-pulp is used along with rags, grass or chemical pulp. Paper, manufactured from such mixed pulps have superior opacity. The normal bamboo-pulp content of Indian paper is about 60 per cent.

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Kraft pulp from bamboos is obtained by single-stage digestion with a smaller proportion of alkali. The paper produced compares favourably in strength with the imported varieties. The Orient Paper-Mills in Orissa specially produce kraft paper. The output is nearly 8-9 thousand tons per year. Bamboo is not suited to the production of mechanical pulp.

The production of bamboo-pulp increased from about 1,700 tons in 1925 to 5,000 tons in 1932. The protective duty of Rs. 45 per ton was imposed on imported pulp. This resulted in the rapid increase in the production. In 1936-37 the production was 19,000 tons, which increased to 33,000 tons just before the war of 1939-45, when the protective duty was reduced to Rs. 30 per ton. Since the outbreak of war, owing to the stoppage of imports India has been obliged to depend upon her own resources of raw material for pulp. This resulted in large increase in the production. In 1944-45, nearly 62,300 tons of bamboo-pulp was manufactured. The present (1959) demand for bamboo for the maximum output of existing paper-mills in India amounts to about 2,10,000 tons per annum.

SECTION 1.
Fibre Plants.

## BAUHINIA PURPUREA Linn.

FAM.—Cæsalpinaceæ.

COM. NS. :—*H.* Kandan, Kaniar, Khaiswal, Sona ; *K.* Sarul, Kanchivala ; *M.* Devakanchan, Raktakanchan.

CHAR. :—A moderate sized, evergreen, usually bushy tree, 6-9 m. high, branches stout, glabrescent. *Bark* ash-coloured to dark-brown. *L.*—10-12·5 cm. broad, roundish, about as long as broad, divided 1/3-1/2 the way down into 2 obtuse lobes, glabrous above, faintly hairy beneath, base cordate, petioles 2·5-4 cm. long. *Fl.*—fragrant, in terminal and axillary few flowered corymbose racemes, buds fusiform, pubescent. Calyx pubescent, tube slightly dilated upwards ; limb about 2·2 cm., splitting into 2 segments slightly divided at the apex into 3 short teeth. Corolla petals 4·5 × 1·3 cm. oblanceolate, acute, with a long claw, white, rose or purple. Fertile stamens 3 to 4 ; filaments as long as the petals. *Fr.*—pod, 15-30 × 2 cm., subwoody flat, pointed at both ends ; seeds 12-16, oblong-ellipsoid, compressed, brown. *Fl. t.*—Sept.-Nov. *Fr. t.*—Jan.-Apr.

DISTR. :—Cultivated throughout the State in gardens. Wild in dry forests of the Deccan and Konkan (Talbot and Woodrow). Sub-Himalayan tract from the Ravi eastwards extending to 1,500 m., Southern India, Madhya Bharat, Bengal, Burma.

FIBRE :—A fibre may be prepared from the bark.

*See*—Dyes & Tans, Gums & Resins, Fodder Plants.

## BAUHINIA RACEMOSA Lam.

FAM.—Cæsalpinaceæ.

COM. NS. :—*H.* Ashta, Dhorara, Gurial, Kachnal, Makkuna ; *K.* Apta, Banne ; M. Apta, Seyara.

CHAR. :—A small deciduous tree, 6·9 m. high ; girth ·9-1·2 m. *Bark* blackish, very rough, with deep vertical cracks. Branches drooping. *L.*—cordate at the base, deeply cleft, broader than long, with rusty or grey tomentum on the under surface. *Fl.*—whitish-yellow, in short-peduncled lax racemes, terminal or leaf-opposed, 7·5-15 cm. long ; pedicels shorter than salyx. Calyx tube turbinate. Corolla petals oblanceolate. Stamens 10, all fertile. *Fr.*—pod, 12·5-30 cm. × 2·5 cm. thick, falcate, 12-20 seeded. *Fl. t.*—Mar.-June. *Fr. t.*—Nov.-Mar. Sheds leaves Dec.-Jan. ; new leaves Mar.-June.

DISTR. :—Common throughout India in deciduous forests. Ghats and hilly parts of Konkan, Deccan (Poona Dist.), Burma, Ceylon, China.

FIBRE :—A strong fibre is made from the inner bark, used for cordage but is not durable in water. It yields a good bast.

See—Gums and Resins, Sacred Plants, Fodder Plants.

SECTION 1.

Fibre Plants.

### BAUHINIA VAHLII W. & A.

FAM.—Cæsalpinaceæ.

COM. NS. :—*H.* Maljan ; *M.* Chambul.

CHAR. :—A gigantic climber with large leaves, divided not far down but deeply cordate. *Fl.*—large, white. *Pods,* very long, thin, rusty, hairy.

DISTR. :—Common in some parts of Konkan and ghats.

FIBRE :—The inner bark yields a fibre used for making ropes for domestic purposes. The strong cordage prepared from the bark is an important article with the hill tribes. They chiefly use it for tying up their cattle and sewing their straw-mats with the fresh bark ; also used for muzzles for oxen and calves. When the plant is cut outer bark being stripped off is thrown away, and the inner coating is used for ropes, it being previously soaked in water and twisted when wet. The bark before being used is boiled and beaten with mallets which render it soft and pliable for being made into ropes and strings for charpoys. Ropes are extensively used for tying up faggots and for other forests works. In Malbar, the fibre is commonly used for tying up rice bundles.

*See*—Dyes & Tans, Fodder Plants.

### BEAUMONTIA GRANDIFLORA Wall.

FAM.—Apocynaceæ.

CHAR. :—A magnificient climbing shrub ; stem strong, woody ; *L.*—ovel, handsome, green. *Fl.*—large, white, trumpet-shaped, with faint lily-like scent, covering the plant with an entire mass of blossom from January to March.

DISTR. :—Native of Nepal and Himalayas. Grown in gardens as an ornamental plant all over.

FIBRE :—Fibre is prepared from the young twigs. Seeds have tufts of silky hair and yield a floss of local importance.

### BIXA ORELLANA Linn.

FAM.—Bixaceæ.

COM. NS. :—*H.* Latkan, Watkan ; K. Kuppamankal, Rangamali ; *M.* Kesari, Shendri.

CHAR. :—A small evergreen tree with cordate leaves on long petioles. *Fl.*—pale purple or white in terminal panicles. *Fr.*—capsule, prickly.

DISTR. :—Largely cultivated throughout India.

FIBRE :—Bark yields fibre used for cordage in West Indies.

*See*—Dyes and Tans.

## BOEHMERIA NIVEA Hook & Arn.

FAM.—Urticaceæ.

COM. NS. :—*E.* China-grass, Ramie, Rhea.

CHAR. :—A shrub. *L.*—alternate, dentate. *Fl.*—very small green in male and female axillary panicles; female panicles in the axils of upper leaves while, the males are in the axils of the lower leaves. There are two distinct varieties (i) with leaves green above and whitish beneath, (ii) with leaves green on both the sides.

DISTR. :—Occasionaly grown in the gardens in the Bombay State. It is a native of the Malay Islands, China and Japan, cultivated in some parts of India.

FIBRE :—Ramie or Rhea is one of the oldest textile fibres known in the eastern countries, especially Egypt, India and China. Hand Woven fabrics have been found in mummy cases in some of the old Egyptian tombs. Its reference has also been found, in the old Sanskrit literature of India, described as grass-linen. In China it is known as China grass.

The plant is indeginous to China and Japan and was introduced in southern U.S.A. in 1855. Most of the commerce of ramie is grown in southern China and northern Indo-China. It is cultivated in some parts of India. In Bengal it is a garden crop and in Assam it is grown as a scattered crop, over some 1,000 acres.

The plant has two distinct varieties—nivea proper (Rhea) with leaves that are green above and whitish beneath and tenacissima (Ramie) with leave green on both sides. Var.—nivea belongs to somewhat cooler climate than the other.

The stems become mature in ten months and change colour from green to brown, when they are ready for cuttings. For obtaining fine, soft fibre, shoots must be cut before they begin to flower. The quality of fibre depends on the age and length of the shoots. Short stems—about 2′ high yield very fine fibre but the quantity is small. Very long stems yield coarse fibres. Shoots about 4′ high yield good fibre in normal quantities.

The cut stems are decorticated by stripping the fibre and passing it through a slit bamboo when the green matter is scraped off and fibre separate. In Japan and U.S.A., stems are decorticated by machinery. Retting does not yield satisfactory results. The crude fibre is heavily coated with gum which is removed by treating with soap solution or lime. Steaming might also be resorted to. The finished clean fibre is called 'filasse'. Ramie fibre contains cellulose up to 66%. The fibre is regarded as the longest, toughest and most silky of all the vegetable fibres. It is very strong and durable and is highly resistant to the action of water. But it has neither the elasticity of wool and silk, nor the flexibility of cotton. Ramie has advantages over wool. The wet strength of ramie is greater than wool. Unlike ramie wool is susceptible to fungus and insects attack when exposed to moisture. The ramie fabrics can be used for summer wear being cool and extremely absorbent.

Ramie is used for sacks, soil cloth, belting table-cloth sheeting, nets, threads, cordage, sewing threads, fishing nets. It is also used in paper industry. Gas-mantles of good quality are also made from it. Ramie is rarely used by itself in textiles but is mixed with wool, silk and cotton. Its special use is in the preparation of lustorous, non-creasable fabrics. Fabrics containing ramie fibre shrink only slightly.

The average annual yield of fibre is 500-600 lbs., for acre. The cost of production is rather high because of the frequent manuring of the crop. Hand decorticating is laborious and costly and there is no suitable machinery for the extraction of fibre. If these difficulties are overcome remie has a great future in India.

The department of Agriculture, Bombay State, is conducting experiments to find out the possibilities of growing ramie under different conditions of soil and climate.

## BORASSUS FLABELLIFER Linn.

FAM.—Palmææ.

COM. NS. :—*E.* Brab tree, Fan-Desert-or Palmyra-Palm ; *G.* Tad ; *H.* Tad ; *K.* Karilale, Ola, Talimara ; *M.* Tad.

CHAR. :—A large diœcious erect palm, 12-18 or even up to 30 m. in height ; girth 1·5--1·8 m. at the base ; swollen above the middle and again contracted upwards ; when young covered with dry leaves, when old marked with semi-circular scars of fallen leaves, *L.*—fan-shaped, ·9-1·5 m. across, 4-·8 m. long, shining, folding along the midrib and united to half their length, and bifid at the apex ; petiole ·4-·8 m. long, with spiny borders. Spathes several, incomplete. *Fl.*—pink and yellow. Male flowers in drooping, stout, cylindrical catkings, arising in pairs of threes from the branches of the spadix ; calyx and corolla 3-cleft ; stamens 6, inserted in the corolla tube, no rudiment of ovary. Female flowers larger, greenish in paniculate spikes ; calyx and corolla 8 or 12 segments, closely unbricate, all similar in colour ; sterile stamens 6. *Fr.*—globose or obovoid, dark-brown, with a tinge of yellow, shining, 15 cm. in diameter or more. *Fl. t.*—Mar.-Apr. *Fr. t.*—May. The tree is said to live over 150 years.

DISTR. :—coastal districts, cultivated. Very common in the coastal districts of Ratnagiri, Kolaba, and Thana. Planted and self-sown throughout the plains of India, Uttar Pradesh, South India : Burma, Ceylon, Indian Archipelago, Native of Tropical Africa.

FIBRE :—The leaf-stalks are highly fibrous and contain a large number of strong, wiry fibres of considerable length. For the extraction of the fibre the leaf-stalk is torn apart into strips, after softening the ends by beating with mallets ; the fibres are then separated from the adhering soft tissue by combing the strips with nail-combs. This fibre is known as 'bassine'. The best quality of fibre is obtained from the margins of the leaf-stalk. The extraction of fibre is done as a cottage industry and fibre is prepared in large quantities in South India. It is used for manufacturing brooms, brushes (for which it is very suitable), ropes for country crafts, twines. In Ceylon, ropes and strings are used for cattle yokes and other agricultural purposes. Stem fibre without any spinning or twisting are reported to be planted into fish-traps after being made pliable. Coir or fibre from fruit pericarp, is doubtless prepared in many parts of India but no definite information can be obtained.

Brooms and brushes prepared from palmyra fibre are not manufactured to any large extent in India. The fibres are exported either as dressed fibres or graded fibres from the ports of Coconada, Calicut and Tuticorin to the U.K., Germany, Holland, Belgium, Japan and U.S.A.

*See*—Medicinal Plants, Gums and Resins, Fruit trees, Famine Plants.

## BROUSSONETIA PAPYRIFERA Vent.

FAM.—Moraceæ.

COM. NS. :—*E.* Paper-mulberry.

CHAR. :—A fast growing, deciduous, medium sized tree. *L.*—large, membranous, obliquely ovate, entire or slightly lobed. *Fl.*—dioecious, greenish. Male spikes cylindric; female heads globose. *Fr.*—fleshy, red, shining.

DISTR. :—Cultivated in the gardens. (There is one tree in the Ganeshkhind Botanical Gardens, Poona ;) Cultivated in Burma, Japan, Malay and Pacific Islands.

FIBRE :—The bark of the tree is stripped in ribbons which after retting yields a fibre. It is fine, soft, very strong, white and lustrous. It requires very little bleach. It is even superior to Bamboo fibre. The Japanese make paper from this and the Burmese, their curious papier-mache, school slates, paper-lanterns and umbrellas. The fibre is joined with arrowroot paste and beaten together to form the famous Tapa or Kapa cloth, which at one time formed the wearing attire of the natives of the Pacific Islands.

Polynesians used to prepare Tapa cloth from the bark of this plant. In the Shan States, the rough paper is manufactured from this plant, as a cottage industry. The paper-pulp is obtained by pounding the bast with water and boiling it with half its weight of lime. The pulp is then spread thinly over coarse muslin cloth and allowed to dry. The finished product is paper. It is glazed black and is used like slate for writing.

Both as a future textile fibre and for the manufacture of paper, this is perhaps the most valuable fibre. The fibre plant deserves to be more carefully investigated than this.

The cultivation of this plant should be tried in the forest areas of the State in shady places.

### BUTEA MONOSPERMA O. Kuntz.

### (BUTEA FRONDOSA Roxb.)

FAM.—Papilionaceæ.

COM. NS. :—*E.* Bastard Teak, Bengal Kino Tree, Flame of the Forest; *G.* Khakda, Khakaro ; *H.* Chinchra, Dhak, Kakria , *K.* Muttala, Kuttugga ; *M.* Palas, Paras.

CHAR. :—A moderate-sized deciduous tree; 12-15 m. high, girth 1·8-3 m. *Bark* fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissure a red juice, which hardens into gum. Young parts covered with grey or brown silky pubescence. L.—pinnately-trifoliolate, in petiole 7·5-15 cm. long. Leaflets 10-15 × 7·5-11·7 cm., coriaceous, hard, glabrescent above, hoary beneath; two lateral ones oblique-ovate ; the terminal one roundish, obtuse. Often emarginate at the apex, rhomboid at the base, larger, as long as broad in middle. *Fl.*—large, bright orange red, on thickly brown pubescent pedicels, arranged in tomentose, terminal and axillary racemes 15 cm. long. Calyx 1·3 cm., silky inside, Corolla-petals equal, densely clothed on external side with silky pubescence; standard broad; keel-acute, incurved. *Fr.*—Legnme, pendulous, tomentose, 6-8 ×4-5·5. Seed oval, flat, brown. *Fl. t.* Feb.-Mar. *Fr. t.*—June-July. Sheds leaves in cold season ; new leaves in Apr.

DISTR. :—Throughout the State, common in deciduous forests of Konkan, Deccan, Khandesh; throughout India from the Himalayas to Ceylon and Burma, usually in open grassy savannahs where it is often gregarious.

FIBRE :—Root-bark yields a strong fibre called ‘Chhoel’, which is used for ropes and cordage in certain parts of Madhya Bharat, Madhya Pradesh and Bombay hill-tribes. In some parts of India it is used for making sandles. The fibre is used for caulking boats on the Ganges and other rivers ; also used for slow matches. It is said to be useful for paper-making.

*See*—Medicinal Plants, Oils, Dyes and Tans, Gums and Resins, Fodder-Plants, Sacred Plants.

## BUTEA SUPERBA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Velkhakar ; *K.* Balli or mat tanga ; *M.* Palasvel.

**SECTION I.**
**Fibre Plants.**

CHAR. :—A gigantic climber ; stem as think as a man's leg. *L.*—three foliate, terminal leaflet large. *Fl.*—bright-orange, large.

DISTR. :—Forests of N. Konkan, Kanara.

FIBRE :—The root-bark and also the young branches yield a strong and useful fibre.

*See*—Dyes and Tans, Fodder Plants.

## CALAMUS PSEUDOTENUIS Becc.

FAM.—Palmeæ.

COM. NS. :—*E.* Cane ; *G.* Natar ; *H.* Bet ; *M.* Vet.

CHAR. :—Extensive climber ; stem slender. Sheaths set with many unequal straight, flat, very sharp spines reaching sometimes 2·5 cm. long. *L.*—about 1·2 m. long ; petioles with a few solitary short spreading spines ; rachis not produced into a flagellum, armed. Flagellum of sheath very long, compressed below, thin, cylindric, set with half rings of hooked spines ; leaflets 50 or more, nearly equidistant, 20-37·5 × 1·8-2·5 cm., linear lanceolate, acuminate, thin, with setulose margins ; nerves 3-5. *Male Fl.*—spikes of the spadix long, flowers usually 2-3 together, sub-globose ; calyx cupular, lobes acute ; petals short, sessile, polished. *Female Fl.*—spadix very long, slender ; branches distant armed with deflexed spines. Spathes flattened. *Fr.*—ovoid, 1·3 cm., in diam. ; hack stout, conical. *Fl. t.*—different times throughout the year.

DISTR. :—Fairly common in the N. Kanara, ghats in the rain-forests ; Western Peninsula ; Ceylon.

FIBRE :—The stem furnishes material for baskets, chair-work, mats and many other purposes ; extensively used throughout the State.

## CALAMUS ROTANG Linn.

FAM.—Palmeæ.

COM. NS. :—*E.* Cane ; *G.* Natar ; *H.* Bet ; *M.* Vet.

CHAR. :—The common rattan ; stem jointed, climbing to a great extent, enveloped in thorny sheaths of leaves. Leaf-margins with minute prickles.

DISTR. :—Sometimes grown in gardens ; abundant in the Southern part of the Western Peninsula ; Ceylon.

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Fibre Plants.

FIBRE :—This is the specie which yields the best and the stoutest rattan cane of commerce. It is split into strips and woven or plaited into baskets, chairs, sofas and carriages; it is made into ropes or stretched entirely across rivers, as the main supports of cane suspension bridges. The pith left after the removal of the surface layer is cut into strips and is used for furniture, mats, etc. Refuse from the splitting is used for making rough cordage.

### CALAMUS THWAITESII Becc.

FAM.—Palmeæ.

COM. NS. :—*E.* Cane ; *K.* Handibet.

CHAR. :—A large climber ; stem stout, erect up to or more than 30 m., 3·8 cm. in diam., leaf-sheaths with close raised lines, set with stiff sharp spines 2·5-5 cm. long, with smaller ones below each line of large ones. L.—about 1·4 m. long, petiole channelled above, set with rings of spines ; rachis not produced into flagellum ; leaflets many, ·6-·75 m. × 3·8-2·5 cm., equidistant, very acute, with ciliate and spiny margins ; 3-nerved beneath. *Male fl.*—spadix up to 6 m. long, very slender, flagellum long, set with whorls of hooked spines. Calyx 3-lobed, rounded. Petals ovate-oblong. *Female fl.*—spadix with stouter branches than the male. Perianth enlarged in fruit. Fr.—seated on the perianth, about 2·5 cm. long, beaked ; ellipsoid. *Fl. t.*—Feb.-Mar.

DISTR. :—Common in the evergreen forests at the foot of the Nilkund ghat of N. Kanara, forming extensive cane brakes in the Yellapur and Supa talukas : Sea-coast near Marmagoa, growing in laterite ; Western Peninsula ; Ceylon.

Fibre :—Same as above.

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### CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*E.* Gigantic swallow-wort ; *G.* Akdo, Dholaakdo ; *H.* Ak., Ark., Madar ; *K.* Arka, Ekke, Mandara ; *M.* Akand, Madar, Rui ; *Sk.* Arka, Mandara, Shuka-phala, Kshirparni, Kshiranga.

CHAR. :—A large shrub, 2·4-3 m. high, much branched, often gregarious, branches stout, covered with cottony pubescence ; *L.*—opposite, 10-20 ×3·8-10 cm., sessile, elliptic or ovate oblong, thick, base cordate, sometimes amplexicaul, both surfaces tomentose ; *Fl.*—in umbellate cymes, purplish or white, buds ovoid ; *C.*—lobes deltoid-ovate, corona shorter than the column, back much curved, apex with two auricles ; *Fr.*—follicles, 9-10 cm. long, broad, green ; *Sd.*—many, comose ; *Fl. t.*—Feb.-July.

DISTR. :—Throughout warmer parts of India ; also in the Himalayas ascending 1000 m. ; very common in S. India, Ceylon, Malay Islands and S. China.

FIBRE :—The plant yields two distinct fibres. (1) Bast fibre from stem, (2) Silk cotton (floss) from seeds.

(1) The bast fibre is fine, white, silky, very strong, and durable under fresh and salt water. It is one of the strongest fibres known. It is superior to cotton in tensile strength. It is used extensively for making fishing nets, fishing lines, bow-strings and twine. The fibre cannot be retted as it rots when so treated, and difficult to separate. It is to be done by hand, which is a slow and expensive process. This has been the chief difficulty for the cultivation and use of this fibre.

(2) The coma of hairs or floss from seeds constitute one of the so called silk-cottons. It is of too short a staple to be spun by itself and is very difficult to deal with owing to its extreme lightness, but if admixed with cotton it can be spun. It can also be spun after chemical treatment but cannot be bleached. It is very soft, white and has a beautiful silky gloss. It is employed to some extent for stuffing pillows; much used for small pillows given to children and to fever patients having a reputation of being cool and soothing. It is sometimes used to adulterate Indian Kapok but is inferior to it in resilience and water repellent properties, even though it possesses good buoyancy.

The Board of trade, England, has stipulated that Indian Kapok ment for life-belts, should not contain any Calotropis floss. The latter can be easily distinguished from Kapok by its greater length and greater thickness.

*See*—Gums and Resins, Sacred Plants, Fodder Plants.

## CALOTROPIS PROCERA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*H.* Ak, Madar, Safedak; *M.* Mandara; *Sk.* Ark, Mandara, Rajarka.

CHAR. :—An erect shrub, usually 1·8-2·4 m. high; young parts white, cottony; bark corky, spongy; L.—subsessile, usually 5·7-15 × 4·5-8·2 cm., ovate oblong, elliptic or obovate; *Fl.*—purplish in umbellate cymes, buds globose; *C.*—about 2·5 cm. across, lobes usually erect, corona-lobes equalling or exceeding the staminal column; *Fr.*—7·5-10 × 5-7·5 cm., subglobose, ellipsoid or ovoid; *Sd.*—broadly ovate, flattened tomentose, comose.

DISTR. :—More or less common in warm dry places throughout India, abundant in Sind, Afghanistan, Waziristan, Arabia, Egypt, Iran, tropical Africa.

FIBRE :—As in the preceeding.

*See*—Gums and Resins, Fodder Plants.

## CANNA INDICA Linn.

FAM.—Cannaceæ.

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COM. NS. :—*E.* Indian shot; *G.* Akalabera; *H.* Sabbajaya; Sarvajaya; *K.* Hudingana, Kalehu; *M.* Kardali; *Sk.* Devakeli, Kamakshi, Sarvajaya, Shitarambha.

CHAR. :—Perennial herb; root-stock tuberous, stem 0·9-1·2 m. high; L.—15-45 ×10-20 cm.; lanceolate to ovate, oval or orbicular, veins arching; *Fl.*—in mixed inflorescences 5-6·3 cm. long; bracts oblong, membranous, green; *P.*—segments 2·5 cm., erect, narrow, greenish or colored, staminodial segments, 3 sub-erect, spatulate, 1 linear revolute; *Fr.*—sub-globose or oblong; 3-lobed, echinulate; *Sd.*—many, globose, black, shinning; *Fl. t.*—more or less throughout the year.

DISTR. :—Widely cultivated in India.

FIBRE :—Recent studies in Australia indicate that fibre can be extracted by mechanical means from Canna Indica and can be used as a substitute for jute in the manufacture of rope-twine and sack-cloth.

## CANNABIS SATIVA Linn.

FAM.—Moraceæ.

COM. NS. :—*E.* Hemp; *G.* Bhang, Ganja; *H.* Ganja; *K.* Bhangi; *M.* Bhang; *Sk.* Ganja, Harshini, Mohini, Shivapriya, Siddhapatri, Vijaya, Unmattini.

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CHAR. :—A tall erect dioecious annual herb, strongly smelling, usually 0·9-1·5 m. high in its feral state, female plant supposed to grow taller than the male; *L.*—alternate or the lower opposite upper 1-3, lower 3-8 foliate, serrate; *Fl.*—small axillary, dioecious, male fascicled; female crowded under convolute bracts; male flowers, sepals 5, imbricate, female perianth hyaline. *Fr.*—achene.

DISTR. :—Throughout India. Wild in the Himalayas, Central Asia; cultivated in tropical and temperate regions.

FIBRE :—The plant is cultivated commercially for its fibre mostly in Europe and parts of China, Japan and U.S.A.

In India, the cultivation of the plant is permitted in the districts of Almora, Garhwal and Nainital in the U. P., for its fibre and not for the production of hemp drugs. It is found growing wild in Garhwal hills. The plant is also cultivated to a small extent in Kashmir, Nepal and Travancore. The quality of fibre extracted from plants cultivated in the plains is said to be poor.

The plants are harvested as soon as the lower leaves are shed and the plant-tips and flowers turn yellow. The quality of fibre depends upon the stage at which the plants are harvested. Harvesting, just at the time of setting flowers, give the optimum yield and the quality of fibre is high. Early harvesting yields fibre of poor tensile strength, while late harvesting produces coarse and brittle fibre. In Russia, the male-plants which give a better grade fibre are harvested earlier than the female plants.

The fibre is extracted from the stalks either by water-retting or dew-retting. In Europe and America method of dew-retting is followed while water-retting method is common in Russia, Hungary, Yugoslavia and India. The stalks are tied in bundles and submerged in stagnant or slow running water until the bark with the fibre separates out from the central wood portion. The period of retting varies depending upon the temperature of water and locality. About 3-4 days are quite sufficient in hot and damp weather while 8-15 days are required in cool, dry weather. Dew-retted fibre is grey-white while water-retted fibre is cream-white ; chemical retting has been tried but none of the methods have been found satisfactory on commercial scale.

In India the fibre is separated from the retted stalks by hand while in Europe and America, it is separated by breaking and scutching by machinery. The scutched fibre is then cleaned and split into finer strands by drawing the fibre over sets of upright steel-pins. The cleaned fibre is graded according to quality, length and colour.

An average crop yields 2-3 tons of dry stalks per acre, from which yield 1/2-3/4 tons of clean fibre. The quality depends upon the method of preparation. The colour may be straw-white, pale-brown, yellow, pale or deep-grey, green or black. The best quality being white or straw coloured with lustre like linen.

The fibre is strong, lustrous and durable. Commercial fibre is 40-80 inches in length. Its tensile strength is greater than linen while it is less fine than linen.

Hemp fibre is employed in the manufacture of cordage twine, sail-cloth, tarpauline, and carpet yarns. Hemp is used for ropes and large quantities are still employed (though its use is slowly declining; its place being taken by hard fibres as manila and sisal), for this purpose especially in Central Europe, Russia, Italy and U.K. Much of the hemp consumed in U.S.A., is processed into twines, other articles being carpets, warps and oakum.

Loose fibre is used for caulking boat-seams. During the last war, green fibre extracted without retting, by decorticating and cottonising process, was used as a substitute for jute in making binder-twine and sacks. Hemp stems can be used for the manufacture of coarse paper.

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The best qualities of hemp fibre, in the world, were produced in Italy up to World War II. In normal times she is the largest exporter of this fibre. During the first forty years of the twentieth century there were in the world approximately two and a half million acres of land devoted to the cultivation of hemp. Russia is the largest producer, cultivating about 3/4th of total acreage and normally producing 600-800 million lbs. of fibre but the quality grown here is rather inferior. Poland received some of the Russian hemp-lands after the first World War and became a fairly large producer and exporter of hemp. Yugoslavia also exported considerable quantity of hemp prior to the second World War. France, Spain, Hungary and Japan retain their output of fibre for home consumption.

*See*—Oils.

## CANTHIUM PARVIFLORUM Lamk.

FAM.—Rubiaceœ.

COM. NS. :—*M.* Kirni.

CHAR. :—A thorny rigid shrub, *L.*—ovate or roundish. *Fl.*—small yellowish. *Fr.*—very small ellipsoid, yellow when ripe, edible.

DISTR. :—S. S. Country, Kanara ; Western Peninsula : Ceylon.

FIBRE :—Stem is said to yield fibre.

*See*—Fruit Trees (W).

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## CAREYA ARBOREA Roxb.

FAM.—Lecythidaceæ.

COM. NS. :—*E.* Wild Guava ; *G.* Kumbi ; *H.* Kumbhi, Vakambi ; *K.* Daddala, Gavahannu, Hennumatti ; *M.* Kumbha.

CHAR. :—A glabrous middle-sized or sometimes a large deciduous tree, 9-18 m. high ; girth 1·5-2·4 m. *Bark* thick, rough, dark-grey ; inner bark red, fibrous. Wholly glabrous. *L.*—15-30 × 10-15 cm., oblong, obovate or orbicular, membranous, sessile or very short-petioled crenate, denticulate, obtuse or shortly acute. *Fl.*—5-6·5 cm. diam., white with purple filaments, subtended by 3 unequal bracts arranged in short spikes, with an unpleasant smell. Calyx campanulate. *Fr.*—6·5 × 5 cm., globose, and crowned with the persistent calyx-tube. *Fl. t.*—Mar.-Apr. *Fr. t.*—May-July. Sheds leaves during early part of hot season and is soon covered with new leaves (Mar.-Apr.). Leaves turn red in cold season.

DISTR. :—Very common throughout India and the State in monsoon forests; also in valleys and ravines throughout the drier areas. Common in S. Konkan and Western Ghats; Ceylon, Malayan Peninsula and Siam.

FIBRE :—The bark yields a fibre in broad bands used for coarse cordage, tying carts and rafters. It affords a stuff suitable for brown paper of good quality (Lisboa). In Burma, it is used for putting under elephant saddles.

Fibrous bark is used in Mysore as a slow-match to ignite gunpowder. It has been successfully used in the ordnance depots as a substitute for English beech in fuses.

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins, Fruit Trees (W), Fodder Plants.

## CARICA PAPAYA Linn.

FAM.—Caricaceæ.

COM. NS. :—*E.* Papaw, Papaya; *G.* Chibda, Papayi; *H.* Papaya, Papita; *K.* Guppe, Pangi, Pappayi; *M.* Papaya, Popayi; *Sk.* Chirbhita, Nalikadala.

DISTR. :—Native of W. Indies, Mexico and Brazil. Cultivated throughout India.

FIBRE :—The bark of the stem is used for making ropes in Africa and W. Indies.

*See*—Fruit Trees.

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## CARLUDOVICA PALMATA Ruizct Pav.

FAM.—Cyclanthaceæ.

COM. NS. :—*E.* Panama-hat Plant.

CHAR. :—A stemless bush with large palm like leaves, similar to those of fan palm, with long and cylindrical stalks. The flowers followed by the seed, are produced in cones borne on short stalks arising from the base.

DISTR. :—Very ornamental; largely cultivated in gardens all over the State and in India. A native of Tropical America.

FIBRE :—The leaves are torn into ribbons and then into shreds. These shredded ribbons are sub-merged in boiling water for 10-15 minutes, dried in the sun for three hours and bleached in sulphur-chamber for a day. The product is a kind of strand (Toquilla) used for manufacturing hats. 8-10 leaves are required to make one hat.

## CARYOTA URENS Linn.

FAM.—Palmaceæ.

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COM. NS. :—*E.* Wild Sago-palm, Hill-palm ; *G.* Sankar-Shiv-jata ; *K.* Bagni, Baini, Bhyni, Bugani ; *M.* Berli, Bherli-mad.

CHAR. :—A very handsome palm, 9-18 m. high; girth ·6-·9 m. Stem cylindric, annulate, smooth, shinning grey. *L.*—5·4-6 × 3·6 m., bipinnate, on stout, sheathing petioles, pinnæ numerous, leaflets cuneate, triangular, præmorse. Spathes several. *Fl.*—monoecious in long, pendulous, branched spadices. Calyx and corolla 3-parted, valvate. Male flowers yellow ; stamens numerous, rudiment of ovary none. Female flowers greenish or purplish, smaller than male, staminodes 3, ovary 1-celled. *Fr.*—roundish or nearly so, size of a nutmeg, brownish, stinging (hence the name *urens*). *Fl. t.*—and *Fr. t.*—throughout the year.

DISTR. :—Common in evergreen forests throughout the hotter parts of India, the Konkan and N. Kanara, Mahabaleshwar, Khandala. In the lower Himalayas, from Nepal eastwards ascending to 1,500 m. in Assam, Khaisa hills, Manipur, Chittagong, shady valleys of the Eastern and Western Ghats in evergreen forests. Low country of Ceylon. Much planted in gardens.

FIBRE :—One of the most important of the fibre producing leaves. This yields from the sheathing leaf-stalk, the well-known *kittul* fibre of commerce. The fibre is of considerable value being strong and of fair length. The colour is dusky brown to black and the fibres are straight, smooth and very elastic ; used for making ropes and fishing nets and fishing lines.

The chief use of the fibre is for manufacturing brushes and brooms, for this purpose the clean fibre is steamed first and then treated with linseed oil. Hair, cloth and horse-brushes are prepared from it. Large quantities of the fibre were exported from Ceylon for making brooms and brushes. Most of the fibre is now employed in Ceylon for manufacturing brooms and brushes. Several brush factories in India also use *kittul* fibre. Experimental trials have been made in India for its better utilization.

## CASSIA AURICULATA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*E.* Tanner's casis ; *G.* Awal ; *H.* Taroda, Tarwad ; *K.* Avarike, Sakusina, Tangadi ; *M.* Tarwad ; *Sk.* Avartki, Charmaranga, Mayahari, Pitakilaka.

CHAR. :—A tall much branched evergreen shrub ; bark smooth, reddish brown. *L.*—7·5 × 10 cm. long, rachis densely pubescent, a linear gland between each pair of leaflets ; stipules very large, rotun-date, reniform; leaflets 8-12 pairs, slightly overlapping, oblong-obovate, mucronate, dull green above, pale beneath; *Fl.*—large, yellow with orange veins, 5 cm., across, in terminal and axillary corymbose racemes; *Fr.*—pod, 20-25., cm., obliquely septate; *Sd.*—30-35, rhombohedral; *Fl. t.*—Jan.-July.

DISTR. :—Dry regions of Rajputana, Madhya Pradesh and W. Peninsula, Ceylon, Burma.

FIBRE :—Bark gives a fibre used for making ropes.
*See*—Dyes and Tans, Famine Plants.

### CEIBA PENTANDRA (Linn) Gaertn.

### (ERIODENDRON ANFRACTUOSUM DC.)

FAM.—Bombacaceæ.

COM. NS. :—*E.* The white silk cotton tree, Kapok tree; *H.* Hatian, Katan, Safed-Simal, Senibal; *K.* Dudi mara, Bililurga, Marali; *M.* Katesawar, Shamieula.

CHAR. :—A moderate-sized tree, grows large in size in Khandesh, 18-24 m. high, girth 3-3·6 m. Trunk straight, armed when young with conical woody prickles; branches spreading horizontally; all parts glabrous. L.—5-8 foliolate on petioles as long as or longer than the leaflets; leaflets 7·8-10·4 × 2·6 cm., lanceolate, acuminate or cuspidate with a mucro, entire or serrulate towards the ponit, glaucescent beneath, shortly petioluled or almost sessile, *Fl.*—appearing before the leaves, of a dingy white colour, on peduncles about 5·2 cm., fascicled, exillary or terminal, 1-flowered, drooping. Calyx thick, coriaceous, 5-lobes roundish, glabrous externally, downy within. Petals 5, 2·6 cm., oblong, connate at the base, thick, tomentose outside. Staminal bundles 5, united at the base, each bearing 2-3 variously convolute, linear, 1-celled anthers. Ovary ovoid, 5-celled, thick; stigma entire or 5-lobed. *Fr.*—capsule oblong, thick, coriaceous, 5-valved. Seeds numerous, black, imbedded in a silky wool. *Fl. t.*—Feb.-Mr. *Fr. t.*—Apr.-May. Sheds leaves in cold season; continues leafless till hot season.

DISTR. :—Wild in Khandesh; also in Gujarat, Poona, Konkan, N. Kanara; throughout hotter parts of India. Planted near village temples. Burma.

FIBRE :—The bark yields an inferior reddish fibre which is used locally for making ropes. The floss from the seeds is brittle, elastic, lustrous, white or pale yellow. It is used in upholstery. It is superior to Salmalia floss as it does not mat in cushions or mattresses. It is largely exported to Europe where it is known as Kapok. The bulk of the Kapok comes from Java. It is too short a staple to be spun; but suitable machinery has now been devised for carding and Kapok can now be spun into yarn. Due to its non-conductivity, it has been produced in sheet, quilt and padding forms,

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suitable for thermal and acoustic insulations. It is used in the production of life-saving equipment and in construction of thermally insulated and sound-proof covers and walls. During the last war it was employed for insulating tanks, for lining aviation suits, for filling floats of army assault bridges and generally for replacing cork.

A good tree at maturity (15 years old) may produce 600-900 pods or 6-9 lbs. of clean floss. The tree is rarely found in Bombay State and is not of much economic importance unless large plantations are started.

*See*—Oils, Gums and Resins.

### CERBERA ODOLLAM Gærtn.

FAM.—Apocynaceæ.

COM. NS. :—*K.* Chanda, Hande, Tande ; *M.* Sukanu.

CHAR. :—A large evergreen shrub or a small tree, with acrid milky juice ; attains 12-13 m. in height and ·9-1·2 m. in girth. Branchlets whorled, marked with leaf-scars. *Bark* white. *L.*—10-15 cm. to 30 cm., oblong-lanceolate or obovate-lanceolate, acuminate, tapering into a slender 2·5-4 cm., petiole, entire and shining. *Fl.*—white, sometimes with a yellowish throat, sweet-scented, in a corymbose terminal pedunculate cyme. Calyx-lobes reflexed, about 1·3 cm., deciduous along with the bract ; bracts coloured, large, very deciduous. Corollatube 2 cm. long, sometimes longer, nearly as long or longer than the lobes. *Fr.*—drupe, ovoid, brown, or blackish when ripe, size of an apple. *Fl. t.*—June-Jan. (Cooke). At different times throughout the year (Talbot).

DISTR. :—Salt swamps of the South Konkan and N. Kanara ; planted in hedges near the sea-coast at Murdeshwar. Throughout India in salt-swamps and on the sea-coast, abundant on the Malbar coast. Malaya Archipelago, China, Australia, Pacific Islands.

FIBRE :—Bark yields fibre.

*See*—Medicinal Plants, Oils, Poisonous Plants and Fish Poisons.

### CHAMÆROPS HUMILIS Linn.

FAM.—Palmeæ.

COM. NS. :—*E.* Dwarf fan-palm, Hair-palm.

CHAR. :—A highly variable species with fan-shaped leaves.

DISTR. :—Indigenous to Europe and N. America. Grown as an ornamental plant in gardens in India.

FIBRE :—Stem yields a curled fibre used for stuffing upholstery and the manufacture of carpets and sails. The fibres are firm and elastic and can be used in the preparation of flax-cotton.

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## CHROZOPHORA PLICATA A. Juss.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Okharda ; *H.* Shadevi, Sonballi ; *M.* Suryavarta.

CHAR. :—Annual erect hoary herb with a long straight slender taproot. *L.*—thick, variable, wrinkled, hairy. *Fl.*—male and female. *Fr.*—small densely hairy with silvery scales.

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DISTR. :—Deccan, S. M. Country, Gujarat ; throughout India in drier parts : Spain and North Africa.

FIBRE :—The Santals prepare a strong and useful fibre from the bark, but it is difficult to seperate (Campbell).

*See*—Poisonous Plants and Fish Poisons.

## CISSAMPELO PAREIRA Linn.

FAM.—Menispermaceæ.

COM. NS. :—*E.* Velvet-leaf ; *G.* Venivel ; *H.* Nirbisi ; *M.* Pahadvel, Paharmul ; *Sk.* Patha, Uthika, Venivalli.

CHAR. :—A climbing shrub, branches more or less pubescent ; *L.*—peltate, 3·8-10 cm. liam. ; orbicular or reniform, cordate at the base, mucronate, margins ciliate ; *Fl.*—minute, yellowish ; male flowers in axillary cymes, petals combined into cupshaped corolla ; female flowers in elongate, solitary, or twin, axillary racemes ; *Fr.*—drupe, sub-globose, compressed, hairy, red ; *Fl. t.*—July-Sept.

DISTR. :—Throughout tropical and sub-tropical India ; warm parts of Asia, E. Africa and America.

FIBRE :—The plant yields a strong fibre from the roots.

## CISSUS ADNATA Roxb.

### (Vitis adnata Wall).

FAM.—Vitaceæ.

COM. NS. :—*M.* Nadena.

CHAR. :—A long slender climber ; clothed with orange-red pubescence. *L.*—large, broadly ovate, serrate. *Fl.*—greenish-yellow in umbellate cymes, *Fr.*—sub-globose, black when ripe.

DISTR. :—Konkan, Deccan, Kanara ; throughout India ; Java, Borneo, Philippines, Ceylon.

FIBRE :—Stem is reported to yield a fibre used for cordage.

## CISSUS QUADRANGULARIS Linn.

### (Vitis quadrangularis Wall).

FAM.—Vitaceæ.

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COM. NS. :—*E.* Edible-stemmed Vine ; *G.* Chodhari ; *H.* Hadjora ; *K.* Mangroli ; *M.* Kandvel.

CHAR. :—A climber ; stem leafless when old, fleshy, quandrangular, angles of the young branches winged. *L.*—broadly ovate. *Fl.*—in umbellate cymes. *Fr.*—globose, red when ripe.

DISTR. :—Throughout the driest districts of the State ; througout India ; Java, E. Africa, Malaya, Ceylon.

FIBRE :—Stem and root yield a strong fibre.

## CORCHORUS TRILOCULARIS Linn.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Tandessir, *M.* Kadu-chinch.

CHAR. :—Annual. Stems and branches hairy. *L.*—elliptic or oblong-lanceolate, serrate. *Fl.*—yellow in short cymes. *Fr.*—long with a short erect beak, 3-4 angled, hairy when young.

DISTR. :—Deccan and Gujarat ; Tropical Africa, Afganistan.

FIBRE :—A good rope is manufactured from the fibre (Murray).

*See*—Famine Plants.

## CROTALARIA SERICEA Retz.

FAM.—Papilionaceæ.

CHAR. :—A short undershrub. *L.*—very variable in breadth oblong-lanceolate, silky beneath. *Fl.*—in terminal long, 20-50 flowered racemes, yellow with a purplish tinge.

DIST. :—Konkan, Kanara, throughout India ; Malaya, Andamans.

FIBRE :—Fibre is sometimes prepared from the plant.

## CROTALARIA STRIATA D.C.

FAM.—Papilionaceæ.

COM. NS. :—*H.* San.

CHAR. :—An undershrub ; stem stout ; very young branches silky. *L.*—membranous ; leaflets elliptic. *Fl.*—dull yellow in long terminal or lateral 20-50 flowered racemes. *Fr.*—pod much deflexed, oblong, cylindric.

DISTR. :—Throughout India ; Ceylon, Malaya, Tropical America and Africa.

FIBRE :—It yields a fibre similar to Sann-hemp.

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### CRYPTOLEPIS BUCHANANI Roem. & Schult.

FAM.—Asclepiadaceæ.

COM. NS. :—*H.* Karanta, *M.* Setakavali.

CHAR. :—A large twining shrub. *L.*—elliptic ; very strongly veined, whitish beneath. *Fl.*—small, greenish-yellow. *Fr.*—follicles straight, rigid, horizontal, very gradually tapering. Seeds with coma.

DISTR. :—Konkan, Deccan, S. M. Countary, Kanara ; Tropical India : Ceylon.

FIBRE :—The plant yields a fibre used for cordage and for making a kind of cloth by the hill tribes.

### CRYPTOSTEGIA GRANDIFLORA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*E.* Wild rubber plant. *M.* Vilayati vakandi, Kavali.

CHAR. :—A lofty climber with glossy elliptic leaves ; *Fl.*—large rose-coloured, showy. *Fr.*—follicle, three winged. Seeds with coma.

DISTR. :—Very common along Deccan canals. Along water-courses and in hedges in Gujarat, S. M. Country.

FIBRE :—Bark yields appreciable quantity of fibre. It is suitable for making fishing nets. Baskets are made from the fibrous twigs by village people. Some attempts were made to use the fibrous material for paper-making. During World War II when there was a rubber shortage, this plant was looked upon as a source of rubber. It was decided to cultivate this plant on a very large scale in order to collect latex for the manufacture of rubber. The Forest Department of the then Bombay State collected about 3,000 lbs. of seeds for this purpose. For collecting the seeds fruits of this plant, were gathered in thousands, the seed was separated from the floss which was stored in gunny bags. The floss which is rather yellowish in colour was found useful for stuffing pillows, etc., like other flosses.

As this plant is found growing wild along the Deccan canals, it is worthwhile making efforts to find out a use of this floss for the purposes for which Java and Indian kapoks are used.

### CYPERUS CORYMBOSUS Rottle.

FAM.—Cyperaceæ.

CHAR. :—A tall rush-like herb ; rhizome creeping, clothed with dark grown scales ; root fibres stout. *Stem* spongy somewhat articulate when dry. Practically no leaves. *Fl.*—in compound umbels with 6-8 rays ; spikelets rusty-brown.

DISTR. :—Konkan; more or less throughout India; Ceylon, Tropical Africa, America.

FIBRE :—Strips of split sedges are used for making mats in South India.

## CYPERUS TEGETUM Roxb.

FAM.—Cyperaceæ.

CHAR. :—Herb with woody rhizome which is stout and horizontal. Root-fibres wiry, clothed with branched hairs. Stems solitary *L.*—short. *Fl.*—in compound or decompound umbels; rays many · spikelets reddish brown.

DISTR. :—Konkan, Deccan. Throughout India, Sind, Ceylon, Tropical Africa. Cultivated in Mauritius..

FIBRE :—Much employed in Calcutta for the manufacture of mats, which are sometimes exported to Europe.

## DÆMIA EXTENSA Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Nagal-dudli, *H.* Gutak, Utran, *K.* Hala-koratige, *M.* Utarani.

CHAR. :—A middle-sized hairy twiner. *L.*—roundish-cordate. *Fl.*—dull-white, drooping. *Fr.*—follicle, cylindric, beaked. Seeds with coma.

DISTR. :—Common in bushes. Deccan, Gujarat, S. M. Country, Konkan; throughout India in hotter parts, Sind, Ceylon, Afghanistan.

FIBRE :—The stem yields a fine fibre which has been recommended as a substitute for flax. It is said to be very fine and strong. It is said to be sometimes used for fishing lines. It has no commercial importance.

*See*—Medicinal Plants.

## DEBREGESIA VELUTINA Gaud.

FAM.—Urticaceæ.

COM. NS. :—*K.* Kapsi, Kurgul.

CHAR. :—An evergreen tall erect shrub or small tree, 4·5-7·5 m. high; girth ·3-·45 m. Bark thin, greyish-brown, rough. Branches rough with warty excrescences and the scars of fallen leaves. *L.*—5-17·5 × 2-5 cm., lanceolate, oblong-lanceolate, acute or acuminate, sinuate, membranous, rough above, prominently reticulated and covered with a white or grey tomentum beneath, 3-nerved. *Fl.*—monoecious in heads or clusters on dichotomous, axillary, puberulous cymes, solitary or twin. *Fr.*—yellow when ripe, resembling a small raspberry. *Fl. t.*—Nov.-Janu. *Fr. t.*—Dec.-Feb.

DISTR. :—Common in evergreen forests of Konkan and N. Kanara; Sub-Tropical Himalayas from Kumaon to Sikkim. Alt. 900-1-800 m. Assam, Khasia Hills. Western Peninsula ascending to 2,100 m. in the Nilgiris, Ceylon.

FIBRE :—The inner bark yields a strong fibre used for cordage and bow-strings, twines, ropes and fishing lines.

## DENDROCALAMUS STRICTUS Nees.

FAM.—Gramineæ.

COM. NS. :—*E.* Male Bamboo; *H.* Bans, Bans-kaban, Kopar; *K.* Kili-bidarn; *M.* Basa, Udha, Vasa.

CHAR. :—A deciduous densely tufted bamboo with strong stems, 6-15 m. high and 2·5-7·5 cm. diameter, which are solid or only with a small cavity, glaucous-green when young, dull-green or yellowish when old; nodes swollen, the lower often rooting, inter-nodes 30-45 cm. long; upper branches decurved; stem sheath variable, 7-·5-30 cm. long, covered on the back with golden-brown stiff hairs (or in dry localities sometimes glabrous), striate, rounded on the top, ciliate on the margins.

DISTR. :—Throughout the State and dry regions of India in deciduous forests. Konkan (planted), Deccan (rocky hills), Gujarat, Panchmahals. Gregarious over large areas in N. Kanara, S. M. Country, Sub-Himalayan tracts from the Indus eastwards up to 900 m., Burma, Java.

FIBRE :—Stem yields fibre suitable for paper-manufacture.

*See*—Famine Plants, Fodder Plants.

## DERRIS SCANDENS Benth.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Mota Sirili.

CHAR. :—Very large climber; stem dark purple. *L.*—imparipinnate; leaflets elliptic oblong. *Fl.*—numerous in axillary racemes, white or pale-pink. *Pod*—straight, tapering to both ends, narrowly winged on the upper suture.

DISTR. :—Deccan, Konkan, Kanara, Bengal, Madhya Bharat, Western Peninsula: Ceylon, S. E. Asia, N. Australia.

FIBRE :—The bark affords a coarse fibre used for making ropes.

## DESMODIUM LATIFOLIUM DC.

FAM.—Papilionaceæ.

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Fibre Plants.

CHAR. :—An erect undershrub; branches spreading, densely hairy. *L.*—one foliate; leaflets broadly ovate, hairy. *Fl.*—purple in terminal or axillary racemes; *pods*—4-6 joined, clothed with hooked-hairs.

DISTR. :—Moist forests, Konkan, Deccan, N. Kanara; throughout India, Ceylon, Tropical Africa, Malaya, Philippines.

FIBRE :—It affords a strong paper-fibre.

*See*—Fodder Plants.

## DESMOSTACHYA BIPINNATA Stapf.

## (ERAGROSTIS CYNOSUROIDES Beauv.)

FAM.—Gramineæ.

COM. NS. :—*G.* Dabha ; *H.* Dab, Davoli ; *M.* Darbha ; *Sk.* Darbha, Kusha, Pavitra.

CHAR. :—Perennial tall grass, branched from the base; rootstock stout, creeping; stolon very stout, covered with shining sheaths; stems 30-90 cm. high, tufted, smooth, erect stout; *L.*—many, the basal fascicled, reaching 50 cm., long, rigid, margins hispid; sheaths glabrous, ligule a hairy line; *Fl.*—panicle 15-45 × 1·3-3·8 cm. erect pyramidal or columnar, interrupted, branches short crowded, clothed with sessile spikelets; *Fl. t.*—Dec.

DISTR. :—Throughout India in hot and dry places; Nubia, Egypt, Syria.

सत्यमेव जयते

FIBRE :—Fibre is used for rope and cordage. Recent experiments, carried out at the Forest Research Institute, Dehra-Dun, indicate that the fibre is likely to prove suitable for production of cheap Badami-paper.

*See*—Sacred Plants.

## DICHROSTASTACHYS CINEREA W & A.

FAM.—Mimosaceæ.

COM. NS. :—*H.* Vurtuli, *M.* Sangam Kati.

CHAR. :—A much branched thorny shrub; branches ending in spines. *L.*—2-pinnate; leaflets minute. *Fl.*—yellow in drooping spikes. *Pod*—flat, dark-brown, twisted up when ripe.

DISTR. :—Deccan—common on dry stony hills, S. M. Country, Kanara-cultivated; Madhya Bharat, Rajastan, W. Peninsula; Ceylon, Malay Islands, N. Australia.

FIBRE :—Bark yields yellowish-white bast fibre,

## DILLENIA PENTAGYNA Roxb.

FAM.—Dilleniaceæ.

COM. NS. :—*H.* Aggai ; *K.* Kadkangala, Kanagalu, Machil, Modutega ; *M.* Karmal, Karumbel, Kari ; *Tr.* Dillenia.

CHAR. :—A middle-sized deciduous tree. Height 18-21 m., girth 1·8-2·4 m. *Bark* grey or pale-brown, with shallow depressions caused by exfoliation. *L.*—silky pubescent when young, shining when old, oblong-lanceolate, 30-60 cm. × 15-30 cm., narrowed into short winged petiole, denticulate with numerous parallel veins. *Fl.*—umbelled, 2·6 cm., in diameter, sweet scented, yellow. Petals obovate. Carpels and styles 5. *Fr.*—surrounded by enlarged fleshy sepals, globular, size of a cherry, smooth, orange, yellow. *Fl. t.*—Apr.-May.

DISTR. :—Dangs, Konkan, S. M. Country and Kanara. In deciduous forests of both the Peninsulas ; along the base of the Himalayas from Oudh and Bihar to Assam, Bengal, Burma ; South India.

FIBRE :—Bark yields fibre which is said to be used for cordage.

*See*—Fruit Trees (w), Fodder Plants.

## DOLICHANDRONE FALCATA Seem.

FAM.—Bignoniaceæ.

COM. NS. :—*K.* Gudmurki, Vudeedu, Wudige ; *M.* Medsingi.

CHAR. :—A middle-sized deciduous tree, 6-15 m. high, young parts pubescent. *Bark* thin, bluish-grey, exfoliating in irregular woody scales. *L.*—7·5-15 cm., usually opposite, unequally pinnate, 2-3 pairs ; leaflets 2-3 pairs, 1·3-4 cm. and nearly as much across, orbicular, obtuse or short-acuminate, short-petioled. *Fl.*—4 cm. long, white, fragrant, in few-flowered terminal racemes. Corolla deeply cleft into 5 unequal lobes. *Fr.*—capsule, linear, flat, variously curved, 25-35 × 7·5-10 cm. Seeds with oblong wings. *Fl. t.*—Mar.-May. *Fr. t.*—cold season.

DISTR. :—Throughout the Konkan and N. Kanara in dry deciduous forests. Deccan Peninsula, Mysore, Madhya Pradesh, Rajasthan. Found often in rocky places.

FIBRE :—The plant yields a blackish coarse bast fibre.

*See*—Fodder Plants.

## ENTADA PHASEOLOIDES Merr.

## (ENTADA SCANDENS Benth.)

FAM.—Mimosaceæ.

COM. NS. :—*E.* Giant's rattle, Lady nut, Mackary bean ; *K.* Doddakampi, Hallekayiballi ; *M.* Carambi, Garbe.

SECTION I.
—
Fibre Plants.

CHAR. :—An immense woody climber with a thick trunk; branches terete, glabrous; *L.*—2-pinnate, main rachis grooved ending in bifid tendril; pinnæ 2-3 pairs, stalked; leaflets 7·5 × 2·3-2 cm., oblong or obovate, rigidly coriaceous, dark green; *Fl.*—in panicled or simple spikes 15-25 cm. long, axillary or from the nodes of old branches; *C.*—yellow; *Fr.*—pod, 30-90 cm. long, 3-7·5 × 7·5-10 cm. wide and 3-8 cm. thick, slightly curved, woody, indented between the seeds; *Sd.*—6-15, orbicular, 4·5-5-7 cm. diam., compressed, smooth, shining and brown; *Fl. t.*—Mar.-May.

DISTR. :—Central and Eastern Himalayas, Nepal, W. Peninsula, Ceylon, the tropics generally.

FIBRE :—The tough bark of this plant is used in Ceylon for cordage and ropes.

*See*—Oils.

## ERINOCARPUS NIMONII Grah.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Adivi bhendi, Kad bende; *M.* Chira, Chor, Choura, Haladi; Jangali-Bhendi.

CHAR. :—A small handsome tree. Bark brown, smooth, with narrow longitudinal clefts, fibrous. *L.*—13-20·8 cm. each way, roundish-cordate, irregularly-toothed, palmately 5-9 nerved, sometimes 3-5 lobed; lobes acute, glabrous above, pubescent or glabrescent beneath. Petiole 5·2-13 cm. Stipules caducous. *Fl.*—yellow, nearly 5·2 cm. diam., on short pedicels, in large terminal lax panicles. Bracts cordate-ovate, caducous. Sepals 5, distinct, stellate-pubsecent externally. Petals 5, with pit-like glands inside at the base. Stamens numerous, inserted on an elevated torus, free or slightly connate at the base. Ovary pubescent, 3-celled. Style filiform; stigma minute. *Fr.*—bristly, woody indehiscent, triangular, 3-winged, 1-celled by abortion. Seeds solitary, pendulous, oblong, *Fl. t.*—Sept.-Oct. *Fr. t.*—cold season.

DISTR. :—Deccan (comon at Khandala), Konkan, and N. Kanara, common in mixed monsoon forests of Belgaum and on the ghats below Mahabaleshwar.

FIBRE :—The bark is said to yield an excellent fibre useful for preparing ropes.

## ERIOLAENA HOOKERIANA W. & A.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Arang, Bute, Bother, Botku.

CHAR. :—A small deciduous tree; young parts stellate-downy. Bark grey, scaly. *L.*—10·4 cm.. each way, roundish-cordate, shortly-acuminate, serrate, thinly stellate-hairy,. at length glabrous above,

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rusty-stellate-pubescent beneath. Petiole nearly half the length of the leaf. Stipules linear, caducous. Fl.—5·2 cm. diam., yellow, on peduncles as long as or longer than the petiole, stellate-pubescent, at length glabrous, axillary, 3-flowered. Bracteoles deeply cut into numerous linear segments, pubescent, deciduous before the flower expands. Sepals 5, lanceolate, densely pubescent externally, silky within. Petals 5, shorter than the sepals, with a broad tomentose claw. Staminal column short, bearing numerous, linear-oblong anthers in many series. Ovary sessile, 7-10-celled, ovoid. Style densely pubescent; stigma 8-10-lobed. Fr.—capsule 2·6 em. long, ovoid, woody, 10-valved; valves hairy, tubercled or pitted. Seeds numerous with a tapering wing above. *Fl. t.*—Mar.-May. *Fr. t.*—Nov. Sheds leaves in the hot season.

DISTR. :—Ravines of Mahabaleshwar; in the forests of Konkan; dry forests of the Satpudas in Khandesh. Bihar, Nilgiris, Madhya Pradesh. *Alt.*—1,200 m.

FIBRE :—The bark yields a good fibre.

## ERYTHRINA VARIEGATA L. (var.Orientalis Merr.)

## (ERYTHRINA INDICA Lam.)

COM. NS. :—*E.* Indian coral tree, Mochi-wood; *G.* Bangara, Panarvo, Pandero; *H.* Dadap, Pangara, Pangira; *K.* Halivan, Hongara, Mullumuriiga, Salaki; *N.* Pangara.

CHAR. :—A tall deciduous tree, armed with black pickles; petioles and leaves unarmed. *Bark* yellowish, smooth and shining, peeling off in thin papery flakes. *L.*—pinnately trifoliate, on petioles 10-15 cm. long. Leaflets broad-ovate, entire, short, acuminate, somewhat cordate at the base, membranous, glabrous; terminal leaflet 10-15 cm. long and broad, largest round, cuspidate, truncate, or broad rhomboidal at the base. *Fl.*—bright scarlet, large,' on pubescent pedicels, arranged in axillary of terminal racemes, 15 cm. long. Calyx 2·5-4 cm. long, spathaceous, with a very oblique mouth, 5-toothed at the top; standard 5-8·3 cm. long, the blade 2·5 cm. broad; wings and keel nearly equal. *Fr.*—legume, 15-30 cm. long, cuspidate, distinctly torulose, blackish; 1-8 oblong, red or purple seeds. *Fl. t.*—May-July. Sheds leaves in cold season; new leaves in Mar.-Apr.

DISTR. :—In the deciduous forests of the Konkan and N. Kanara. Indigenous along sea-coast, planted as support for papper-vines, and for grape-vines in the Nasik District. Throughout India from Himalayas southwards, coast forests of Malabar; Burma, Pegu, Andamans and Nicobar, planted for ornament.

FIBRE :—The bark yields an excellent cordage fibre of pale straw colour (Rev. A. Cambell).

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins, Fodder Plants.

## FICUS BENGALENSIS Linn.

FAM.—Moraceæ.

COM. NS. :—*E.* Banyan Tree ; *G.* Vad, Vadlo ; *H.* Bar, Bar-gad or gat ; *K.* Ala, Coli, Nyagrodha, Vat ; *M.* Wad.

CHAR. :—A large evergreen tree, reaching 30 m. high ; girth 6-7·5 ; sending down many ærial roots from the branches and thus extending the growth of the tree indefinitely. These roots afterwards develop into separate trunks. *Bark* 1·3 cm. thick, greyish-white smooth, exfoliating in small irregular plates. *L.*—coriaceous, 10-20 × 5-12·5 cm., ovate to elliptic, base cordate or rounded, shining above, peduncles up to 5 cm. long. *Reseptacles* globose, about 2 cm. in diameter, with male, female and gall flowers. *Fr. t.*—Mar.-June.

DISTR. :—Planted throughout the State in avenues as road-side tree. Self-sown trees with very large crowns are found in Poona and Satara districts and in Western ghats. One tree, near Junnar (in Poona District), with 68 stems descending from the branches is capable of affording shade to 20,000 men (Sykes). Found wild in Sub-Himalayan forests and Western Peninsula hill ranges of South India.

Very large tree near Javali Village, Satara District. The measurements of this tree taken in 1882, were as follows :—circumference of head 1,587 ft., length from north to south 595 feet, and from east to west 442 ft. (Sir G. King).

FIBRE :—The bark yields a short, strong coarse fibre used for making ropes. Ropes are also made from the ærial roots. Paper is also reported to have been formerly prepared in Assam from the bark. The fibre was used in Punjab as slow-matches. The inner bark is an article of common use for cordage.

*See*—Medicinal Plants, Famine Plants, Sacred Plants.

## FICUS HISPIDA Linn.

FAM.—Moraceæ.

COM. NS. :—*G.* Dhed-umera ; *H.* Gobla, Kagsha, Kat-gularia, Konea dumbar, Totmila ; *M.* Bokria, Dhed-umber, Kala-umber, Kharoti, Kurwat.

CHAR. :—A shrub or a small tree, 6-9 m. high ; girth ·9-1·2 m. *Bark* grey, peeling off in irregular flakes, with slight horizontal ribs encircling the tree. Young shoots hispid. *L.*—10-22·5 cm. long,

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**Fibre Plants.**

opposite, ovate or obvate-oblong, shortly acuminate, crenate, serrate, more or less rough on both sides, with short stiff hairs. *Receptacles* ovate or globose, size of a cherry, yellowish, hairy, in pairs, arising from the axils of the leaves or from the trunk and branches; or in pairs or fascicles on elongate stipular bracteate leafly branches issuing from larger branches or stem and often reaching the soil. *Fr. t.*—ripe in hot and rainy season. The opposite leaves are characteristic of this species.

DISTR. :—Throughout the Konkan and N. Kanara, often along the banks of rivers and in moist situations; common in the moist forests near Karwar and along the coast. Throughout India from the Punjab in the north-west to Malacca and Ceylon.

FIBRE :—A fibre is prepared from the bark, which is used for tying bundles in Bombay State especially near the coast.

*See*—Fodder Plants.

## FICUS INFECTORIA Roxb.

FAM.—Maraceæ.

COM. NS. :—*G.* Pepri; *H.* Kahimmal, Khabar, Pakhar, Pilkhan; *K.* Hari-or Kari-basri; *M.* Basari, Dhed-umber, Lendva, Pakari.

CHAR. :—A large spreading deciduous, fast-growing tree, 12-15 m. high; girth 1·5-2·7 m. Seldom throws down one or two ærial roots. *Bark* grey, smooth, scaly, exfoliating irregularly in flakes and patches; inner bark tough, fibrous, milky. *L.*—9-12·5 × 5-6·3 cm., membranous, ovate or ovate-oblong, with entire, sub-undulate margins; 3-nerved; base usually rounded, slightly cordate, sometimes acute; petiole 4-7 cm. *Receptacles* axillary in pairs, sessile, globose, ·6 cm. in diameter, whitish, flushed with red and dotted when ripe; basal bracts 3, minute. *Fr. t.*—ripe May-June. Leaves renewed Feb.-Apr.

Var *Lambertiana* King. Leaves more coriaceous, base broad, rounded, emarginate or subcordate. Receptacles ·9-1·2 cm. diameter.

Var. *wightiana* King. Leaves smaller, often only 6·3 cm. long, narrowed at the base. Receptacles large for the size of the leaves.

DISTR. :—Common throughout the State usually in dry forests. Var. *lambertiana* is common in N. Kanara in moist forests near Yellapur and elsewhere. Var. *wightiana* found in the southern parts of N. Kanara, not so common. Suleman and Salt ranges, the outer Himalayas, plains and hills of India, Bengal, Assam, Burma.

FIBRE :—The bark yields a fibre which is said to be good for preparing ropes.

*See*—Fodder Plants.

## FICUS RELIGIOSA Linn.

FAM.—Moraceæ.

COM. NS. :—*E.* Peepal Tree; *G.* Jari, Pipra, Pipal; *H.* Pipal, Pipli; *K.* Arani, Ashwathamara, Pippala, Ragi; *M.* Pimpal.

CHAR. :—A large evergreen usually epiphytic tree but without ærial roots, 24-27 m. high; girth 7·5-9 m. *Bark* grey, nearly 1·3 m. thick, exfoliating in rounded irregular flakes of varying size, often leaving rounded depressions. *L.*—coriaceous, 10-18 × 7·5-10 cm., ovate, rotund, narrowed upwards and the apex produced into linear-lanceolate tail, entire; base broad, rounded, truncate, shining. *Receptacles* in pairs, axillar, sessile, depressed, globose, 13 mm. in diameter, male flowers few, only near the mouth of the receptacle, gall and fertile female flowers sessile or pedicelled. *Fr. t.*—ripe May-July (sometimes towards the end of rainy season.)

DISTR. :—Planted near temples and in villages throughout the State. Wild in the sub-Himalayan tract, Bengal and Madhya Bharat. Planted all over.

FIBRE :—A fibre is extracted from the bark. In Burma this was formerly made into paper, used in the construction of a peculiar green umbrella used by Burmese.

*See*—Medicinal Plants, Sacred Plants, Famine Plants, Fodder Plants.

## FICUS RUMPHII Blume.

FAM.—Moraceæ.

COM. NS. :—*H.* Gajiun, Gajna, Khabar, Pakar, Pipal; *M.* Ashla, Payar.

CHAR. :—A moderate-sized deciduous tree, at first usually epiphytic, 12-15 m. high; girth 2·1-1-2·4 m. *Bark* smooth, grey, 1·3 cm. thick. *L.*—sub-coriaceous. 7·5-15 × 5·9 cm., broadly ovate with long acumen, entire, sub-undulate margins, glabrous, shining, base broad, truncate. *Receptacles* sessile, in pairs, axillary or from old scars, globular, not depressed at the apex, smooth, 1-3 cm. in diameter when ripe; when young whitish with dark spots, when ripe nearly black. Basal bracts 3. *Fr. t.*—ripe May-June. Renews leaves in Mar. (Closely resembles F. *religiosa*).

DISTR. :—Western Ghats near Bombay, Matheran, Mahabaleshwar, Khandala common; outer Himalayas, mountains of the Punjab, Northern and Western India, Madhya Bharat, Assam; Burma, Malay Peninsula. *Alt.* up to 1,500 m.

FIBRE :—The bark yields a cordage fibre of good quality.

*See*—Fruit Trees (W).

## FICUS TSIELA Roxb.

FAM.—Moraceæ

COM. NS. :—K. Bilibasri ; M. Pipri.

CHAR. :—A large spreading tree without ærial roots. All parts glabrous. *Bark* greenish-grey, smooth. *L.*—10-15 × 5-7·5 cm., broadly-ovate or elliptic-lanceolate, acute or obtusely cuspodate, margins entire ; base narrowed or rounded ; 3-nerved ; petiole 4-5 cm. long. *Receptacles* crowded towards the ends of branches, axillary or from leaf-scars, sessile, globose, about 1·3 cm. in diameter, smooth and purple when ripe. *Fr. t.*—Apr.-Oct.

DISTR. :—Throughout the State ; widely planted as a road-side or avenue tree, for which it is well adapted. Western Peninsula from the Konkan southwards. Madras. Bengal, Ceylon.

FIBRE :—Bark gives a good fibre.

## FURCRÆYA GIGANTEA Vent.

FAM.—Amaryllidaceæ.

COM. NS. :—*E.* Mauritius Hemp, Natal Hemp.

CHAR. :—*L.*—20 to 40, sharply ascending from a short ; stout trunk forming a compact tuft, obovate-lanceolate, bright green, broad-shining, 1·2-1·8 m. or upwards in length ; margins irregularly furnished with week, prickles (occassionally spineless) ; apex forming a green, canaliculate unarmed acumen.

DISTR. :—Cultivated in gardens as ornamental plant and elsewhere throughout the drier parts of the State ; planted along the railway lines in the Deccan.

FIBRE :—Leaves yield a fibre which is sold as Mauritius hemp.

## GIRARDINIA ZEYLANICA Decaisne.

FAM.—Urticaceæ.

COM. NS. :—*E.* Nilgiri nettle, *H.* Bichua, *M.* Mothi Kajoti.

CHAR. :—A tall robust perenniel herb, closely armed with stinging hairs. *L.*—fairly large ; upper variously lobed, serrate. *Fl.*—small, male and female, in racemose cymes. Males in the lower and females in the upper axils. Fruiting cymes clothed with stinging hairs.

DISTR. :—Konkan, Deccan ; Chota Nagpur, Western Peninsula, Ceylon.

FIBRE :—The inner bark of the whole plant abounds in fibre ; that of the young shoots being the finest and the strongest, while that from old stalks is comparitively coarser and shorter. The stems are cut and dried in the sun; by this they loose their stinging property. The bark is then stripped off, tied in bundles and dried. When quite dry, bark is beaten by wooden mallets; the outer-bark where there is no fibre, is broken off. The fibrous part is then boiled in water and then washed and bleached. It is extensively employed in the preparation of twine for fishing nets. It is used in Sikkim for the manufacture of coarse cloth like gunny.

It is of less commercial importance, owing to the difficulty of properly cleaning and degumming the fibre and the cost of collection.

## GOSSYPIUM SPECIES.

In the Indian Union, Bombay State has the largest acreage under cotton—67,103 acres—and it forms the most important cash crop. There are many varieties of cotton cultivated in Bombay. The most important are given below :—

### GOSSYPIUM ARBOREUM Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Tree cotton; *G.* Devkapas; *H.* Deokapas, Nurma; *K.* Hanji, Karibatti; *M.* Devakapas; *Sk.* Karpasam.

DISTR. :—Bengal, Madhya Bharat, Rajasthan and N. W. Provinces. Mostly cultivated in Khandesh.

*See*—Medicinal Plants.

### GOSSYPIUM HERBACEUM Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Cotton; *G.* Kapas; *H.* Kupas, Rui; *K.* Arali, Badari, Hatti, Karihariyale; *M.* Kapus, Rui; *Sk.* Anagnika, Karpas, Sutrapuspha, Tula.

DISTR. :—Cultivated in N. W. F. Province (Pakistan), Baluchistan, Afghanistan, Iran, Mesapotamia, Syria, Egypt, Mediterranean, U.S.A., probably in N. Arabia and Asia Minor. Mostly cultivated in Gujarat and Karnatak.

### GIRONNIERA RETICULATA Thw.

FAM.—Ulmaceæ.

CHAR. :—A very large tree with buttresses at the base; about 30 m. high, with 1·2 m. diameter. *Bark* grey, smooth, splitting into thin plates peeling from the bottom upwards; inner bark reddish with white bast intermixed, very thin, fibrous, fibres long and strong. *L.*—7·5-12·5 × 4-5·6 cm., ovate to ovate-oblong, acuminate or caudate, glabrous, smooth, shining, base rounded or acute. *Fl.*—axillary; male in short paniculately branched cymes; perianth segments 5; female solitary, sepals narrower than the male. *Fr.*—ovoid, hardly compressed, stoutly beaked, glabrous, about 1·8 cm. long. *Fl. t.*—Nov.-Jan. *Fr. t.*—hot season.

DISTR. :—In the evergreen forests near Sonda, Hoolikul, Sirsi and Siddapur sub-divisions of N. Kanara. Western Peninsula, on the ghats from N. Kanara to Travancore.

FIBRE :—The inner bark yields strong and long fibre.

## GOSOYPIUM HIRSUTUM Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Dharwar-American, Upland cotton. *G.* Kapas; *H.* Kapas; *K.* Hatti, *M.* Kapashi.

CHAR. :—A small shrub; lower branches, erect, upper spreading; young parts white hairy. *L.*—varying much in shape-ovate, ovate-cordate, cordate with 1-3 lobes; dark green, drying red. *Fl.*—fairly large, pale-yellow, without any eye, fading red. *Fr.*—boll spherical, cotton silky, long staple.

DISTR. :—Important field crop in the S. M. Country.

FIBRE :—All the above species yield lint. It is spun into yarn and woven into fabrics; used also for filling mattresses and cushions, also for preparing wicks, cords, etc. *Linters.*—(short fibres that remain after the lint is removed), are used for preparation of cellulose, for rayon manufacture.

The Department of Agriculture, Bombay State has established Cotton Breeding Stations in different divisions of the State and evolved varieties and strains with a view to increase yield, ginning percentage, fibre length and disease resistance quality.

## GREWIA ASIATICA Linn.

FAM.—Tiliaceæ.

COM. NS. :—*H.* Dhamin, Karra, Pharsa; *K.* Butu-Udipi; Jani Tadsal; *M.* Phalsa.

CHAR. :—A small tree, trunk short, about 6 m. high, girth ·9-1·5 m. *Bark* grey, rough, ·67-1·34 cm. thick. Shoots, underside of leaves, and inflorescence covered with soft, yellowish tomentum. *L.*—5·2-18·2 ×7·8-10·4 cm., obliquely cordate or broad-ovate, rotundate, acuminate, 5-7 nerved, irregularly toothed, glabrescent above; petiole tomentose enlarged at the top. Stipules linear-lanceolate, subulate, nearly as long as the petiole, often with a broad, oblique base. Peduncles axillary, 2-7-together, usually shorter, sometimes longer than the petioles, bearing from 3-5 flowers on bracteate, puberulous pedicles. *Fl.*—yellow, sepals oblong-lanceolate, reddish-brown or yellow internally. Petals linear-oblong, obtuse or emarginate, half the length of the sepals, with a small, foveolate, villous or fringed scale at the base, Stamens numerous, all fertile, free and inserted on a raised glandular torus; filaments red. Ovary densely villous. Fr.—drupe, the size and shape of a pea, dark-brown, indistinctly lobed with 1 to 2 one-seeded stones. *Fl. t.*—Mar. *Fr. t.*—Apr.-May. Sheds leaves in cold season. New foliage about end of Mar.

DISTR. :—Indigenous in Poona district forests; generally cultivated, for its fruits in India. Sub-Himalayan tract from the Indus eastwards, Madhya Bharat, S. India, Rajasthan, Bengal; Burma; Ceylon.

FIBRE :—From the bark, fibre is extracated which resembles European bast-fibre; it is much employed in rope making.

*See*—Fruit Trees.

## GREWIA LÆVIGATA Vahl.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Kaori, Gurguri; *M.* Gulgollop.

CHAR. :—A small tree. *L.*—thin, lanceolate, 3 nerved, serrate. *Fl.*—yellow in umbellate cymes, small. *Fr.*—drupe 1-4 lobed.

DISTR. :—Not common. North Kanara and Konkan near village sites and in deciduous forests; E. Himalayas, Khasia hills, W. & S. India, Burma.

FIBRE :—Bark yields coarse, strong, yellowish-brown fibre used locally for rope-making and domestic purposes.

## GREWIA MICROCOS Linn

FAM.—Tiliaceæ.

COM. NS. :—*M.* Asolin, Shiral.

CHAR. :—A large hairy shrub. *L.*—papery, smooth, ovate or obovate, entire or slightly toothed, 3-nerved. *Fl.*—in terminal panicle, yellowish. *Fr.*—size of a pea, purplish.

DISTR. :—Common in evergreen forests throughout the Konkan and N. Kanara, Western ghats below Mahabaleshwar, Koyna valley; E. Bengal, Khasia hills, Western Peninsula, Burma, Ceylon.

FIBRE :—Stems yield strong fibre.

## GREWIA TILIÆFOLIA Vahl.

FAM.—Tiliaceæ.

COM. NS. :—*G.* Dhamana ; *H.* Dhamin, Phalsa, Pharsa ; *K.* Butale, Dadsal, Jani, Taddasu ; *M.* Daman, Dhamani.

CHAR. :—A moderate-sized tree, with an erect, tolerably straight trunk, 9-12 m. high ; girth 1·2-1·8 m. *Bark* grey on young trees, dark brown on old ones. Young shoots pubescent with minute stellate hairs. L.—10·4 × 5·2 cm., ovate or roundish ; acuminate, obliquely cordate, 3-5-nerved at the base, bluntly toothed or serrate, coriaceous, sparingly minutely stellate, hairy or glabrescent above, hoary pubescent beneath. Petiole pubescent or glabrescent. Stipules broad-lanceolate, leafy, falcate, auricled, caducous. Inflorescence axillary, 2-3 together (sometimes numerous), equal to or a little longer than the petioles, 3-5-flowered. Pedicels small, pubescent, furnished with bracts. *Fl.*—yellow. Sepals tawny-velvety outside, glabrous inside. Petals emarginate, linear-oblong, half the length of the sepals, with a fringed foveolate scale at the base of each. Stamens numerous, all fertile, free from the base, and inserted upon a raise blabrous torus. Anthers small 2-celled. Ovary 4-celled, hirsute. Style about twice as long as the stamens ; stigma 4-lobed. *Fr.*—drupe, globose, size of a pea, glabrescent, bluish-black when ripe, 2-(rarely) 4-lobed. *Fl. t.*—Mar.-May. *Fr. t.*—June-Oct. Sheds leaves in Mar. ; new leaves in Apr.

DISTR. :—Throughout the deciduous forests of the Bombay State ; common in N. Kanara ; Sub-Himalayan region from the Jumna to Nepal, Madhya Bharat, S. India, Madhya Pradesh, Burma and Ceylon.

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FIBE :—The bark yields a fibre employed in many parts of India for cordage. The fibre is strong, harsh, wiry and hard.

*See*—Fodder Plants.

## GUAZUMA TOMENTOSA Kunth.

COM. NS. :—*E.* Bastard-cedar ; *M.* Rudrakshi.

CHAR. :—A small evergreen tree, 9-18 m. high ; girth, 6-1·5 m., young parts shortly stellate-tomentose. *Bark* brown, rough. *L.*—7·8-11·8 × 5·2 cm., obliquely-ovate or oblong-lanceolate, acuminate at the apex, unequally cordate at the base, irregularly serrate, scabrous or glabrescent above, pubescent or tomentose beneath. *Fl.*—numerous, small, yellow, or dark-purple in terminal and axillary cymose panicles. Sepals 5, connate below the middle. Petals 5, sub-unguiculate and concave at the base, produced at the apex into 2 linear ligulate processes. Stamens 10, united in a column, tubular at the base, and terminated above by 5 fertile, 3 antheriferous filaments, and 5 lanceolate staminodes. Anthers 2-celled; cells diverging. Ovary sessile, 5-lobed, 5-celled. Styles 5, more or less connate; stigma simple. *Fr.*—capsule, woody, indehiscent, oblong or subglobose, 2·6 cm. long, tubercled, black, many-seeded. *Fl. t.*—July-Aug. *Fr. t.*—cold season.

DISTR. :—Cultivated in gardens throughout the State; common about Bombay.

FIBRE :—The inner bark of straight luxuriant young branches yield a fibre found to be of considerable strength, suitable for rope-making.

*See*—Famine Plants, Fodder Plants.

### HARDWICKIA BINATA Roxb.

FAM.—Cæsalpineaceæ.

COM. NS. :—*H.* Anjan; *K.* Kamra, Karachi; *M.* Anjan; *Tr.* Anjan.

CAHR. :—A deciduous tree; tap-root up to 2·4 m. long trunk straight, 15-18 m. high, occasionally 30-36 m. *Bark* thick, dark-grey, rough with irregular vertical cracks, exfoliating in narrow flakes. *L.*—abruptly pinnate, leaflets 2, sessile, oblique, ovate-trapezoid, entire, obtuse, 2·5-7·5 cm. long with 4-5 veins radiating from the base. Stipules small, caducous. *Fl.*—greenish-yellow, on long terminal and axillary panicled racemes. Pedicels as long as the calyx. Sepals oblong obtuse, petals O. Stamens 10. Ovary oblong, sessile; stigma capitate. *Fr.*—pod, thin, dry, lanceolate, 5-7 cm. long, dry with 1 seed at the top. *Fl. t.*—cold season. *Fr. t.*—Apr.-may.

DISTR. :—In the dry forests of the State; a gregarious free but very local, common on the trap of the Satpudas in Khandesh, also in the Belgaum district. There is a small forest of this in Ranebennur Taluka of Dharwar. Nemad in Madhya Bharat, Southern India Berar, Chanda, Banda district of U. P., Tropical Africa.

FIBRE :—The fibre obtained from the inner layers of the bark is slightly wooly and of brownish colour. Chemically it ought to be a valuable fibre as it contains 63·4 per cent. of cellulose. It is strong and is used in the manufacture of ropes by the forest people. It may be a useful paper material.

*See*—Gums and Resins.

### HELIANTHUS ANNUUS Linn.

FAM.—Compositæ.

**COM. NS. :—*E.* Sun-flower. *G.* Surajmaki. *H.* Surajmukhi. *M.* Suryaphula.**

CHAR. :—A large hairy shurb. *L.*—large whitish-green. *Fl.*—heads large, ray florets, yellow. Seeds large.

DISTR. :—Common in gardens throughout the State; in gardens throughout India. Native of Western United States of America.

FIBRE :—A useful textile fibre is obtained from the stalks.

*See*—Oils.

## HELICTERES ISORA Linn.

FAM.—Sterculiaceæ.

COM. NS. :—*G.* Murdasing; *H.* Jonkaphal, Maraphali, Marosi; *K.* Edamuri, Kavargi, Murudi; *M.* Kewan, Murudseng; *Sk.* Avartant, Mrigashringa.

CHAR. :—Large shrub or small tree; young shoots clothed with stellate hairs; *L.*—biferous, 7·5-12·5 × 5-10 cm., ovate orbicular, obliquely cordate, irregularly crowded, scabrous above; *Fl.*—in axillary clusters 2-6 together, bilabiate, red at first fading to lead colour; *Fr.*—follicle of 5—6 beaked, spirally coiled, 5-6·3 cm. long; *Sd.*—numerous, angular; *Fl. t.*—Aug.-Dec.

DISTR. :—From the Punjab and Bengal to Ceylon, Burma, Malaya, Australia and West Indies.

FIBRE :—The inner bark yields a light-brownish or greyish fibre which is not so coarse as sterculia fibres. It is soft, silky but rather lacks in strength. It resembles "China-jute", but is considered inferior in quality to Bengal jute, although it is more durable. It is used for sacking and for tying up rice-bundles in S. India, for sewing up gunny bags and for cattle harness. It has a reputation of lasting twice as long as jute.

*See*—Fodder Plants.

## HIBISCUS CANNABINUS Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Brown Hemp. Deccan Hemp. *G.* Ambadi. *H.* Mesta. *K.* Pundi. *M.* Ambadi.

CHAR. :—An annual or perennial prickly shrub. *L.*—lower simply cordate, upper deeply palmately 3-5 lobed, serrate. *Fl.*—yellow with a crimson eye. *Fr.*—globose, pointed, beaked, very hairy.

DISTR. :—Largely cultivated throughout the State during rains as a fibre and leafy vegetable crop. The important districts growing Ambadi are Dharwar, Sholapur, Panch Mahals, Belgaum and Bijapur. It is grown as a mixed crop with jowar, bajari or pulses,

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FIBRE :—The inner-bark yields fibre. The present practice is to harvest the crop when the stalks are dry. But it is found that fibre of better quality is obtained if the plants are harvested when pods are 50 per cent. ripe. The plants ripen in the months of October and November. They are then uprooted, dried in the sun for a few days and tied into small bundles. The leaves and capsules are removed by beating the bundles with a wooden log. The small dry bundles are then tied into larger bundles and steeped in water and weighed down with stones, for a period of 10 to 15 days. The bark and fibre become loose, and is then peeled off in long strips from the stem. The fibre is cleansed by beating and washing the strips in water. It is then dried in the sun, tied in bundles and prepared for market.

When Ambadi is sown on a good soil and an entire crop, it may yield about 10 to 12 maunds of fibre per acre.

The fibre is of good quality can be used as a substitute for jute. In Bombay State, the fibre is used for the manufacture of ropes, mats and coarse-sacking. It offers a splendid field for agencies either for cordage or more specially for paper making.

The fibre is of commercial value and is exported from Bombay.

The Department of Agriculture, Bombay State, has taken up the work of extending the cultivation and also of introducing and establishing new selections of this crop.

See—Vegetables.

## HIBISCUS FICULNEUS Linn.

FAM.—Malvaceæ.

CHAR. :—A small annual herbaceous bush, usually prickly. *L.*—cordate, orbicular, angled or palmately, 3-5 lobed. Fl.—medium sized. Fr.—ovoid, hairy, with a long slightly curved beak.

DISTR. :—Not common in the State. Konkan, Tropics.

FIBRE :—The stem yields an excellent fibre which Roxburgh considered the best fibre produced from any of the species of Hibiscus, with which he had experimented. " In none have I found so large a quantity, equally beautiful, long, glossy, white, fine and strong as in this. To these properties may be added the luxuriant growth and habit of the plant rendering it an object of every care and attention, at least until the real worth of the material is fairly ascertained " (Roxburgh).

The plant affords a very large proportion of strong fibre of a white colour useful for twine and light cordage (Atkinson).

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## HIBISCUS FURCATUS Willd.

FAM.—Malvaceæ.

COM. NS. :—*K.* Huli gowri.

CHAR. :—A rambling or a climbing plant, stem covered with recurved prickles. *L.*—palmate, 3-5 lobed, hairy, *Fl.*—large, yellow with purple centre. *Fr.*—ovoid, pointed, enclosed in the enlarged calyx.

DISTR. :—Konkan ghats, S. M. Country : Tropics of the old world.

FIBRE :—Bark yields strong, white, flaxen fibre, possessed of considerable tenacity. A dry line broke at 89 lbs. and a wet one at 92 lbs. Owing, however to the strong, sharp spines on the stem, it is not so easily manipulated.

## HIBISCUS MUTABILIS Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* The Changable Rose ; *M.* Badalrang, Jaswand.

CHAR. :—A small tree without prickles. *L.*—cordate, long-stalked, 5-7 lobed or angled, dentate. *Fl.*—large, white or pink in the morning, turning red before night. *Fr.*—globose, hairy flattened.

DISTR. :—Cultivated in gardens throughout the State and India : A native of China.

FIBRE :—The bark yields a strong fibre, of which that from the inner layer is soft and silky, and that from the outer layer is hard and of lead colour. It is rather inferior for cordage purposes.

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## HIBISCUS ROSA-SINENSIS Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Shoe flower ; *G.* Jesuva ; *H.* Jasum, Jasut ; *K.* Dasavala, Dasanihu, Kempapundrika ; *M.* Jasavand ; *Sk.* Aruna, Harivallaba, Japapushpa, Raktapushpi, Rudrapushpa.

CHAR. :—A perennial shrub ; *L.*—short petioled, ovate or ovate lanceolate, irregularly serrate towards the top, entire near the base ; glabrous ; *Fl.*—axillary, solitary ; pedicel jointed above the middle ; involucral bracts 5-7 ; *C.*—7·5 ; cm. diam. ; tubular below, red ; petals thrice as long as the calyx ; staminal tube exerted far beyond the petals ; *Fr.*—no fruits produced in India ; *Fl. t.*—during most of the year. There are single and double forms with different colour shades of orange, yellow, crimson, bright red, magenta, etc.

DISTR. :—Cultivated in gardens throughout India. Native country probably China.

FIBRE :—The bark yields a good fibre.

## HIBISCUS SABDARIFA Linn.

FAM.—Malvaceæ.

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COM. NS. :—*E.* Red sorrel, Rozelle; *G.* Lal ambadi; *H.* Lal ambari; Patwa; *K.* Kempu-pundrike, Pundi-bija or soppu; *M.* Lal ambadi.

CHAR. :—An annual erect, glabrous; stem and branches purple; *L.*—5-7·5 cm. long, base cuneate, 3-5 lobed, (lower leaves sometimes entire), lobes oblong; mid-lobe the longest, serrate, often blotched with purple with darker centre; *Fl.*—axillary, involucral bracts 10, purple, calyx fleshy, purple; *C.*—purple with darker centre; *Fr.*—capsule, ovoid, beaked, hairy; *Sd.*—large, black-brown, covered with minute hairs; *Fl. t.*—Oct.-Dec.

DISTR. :—Generally cultivated in hotter parts of India, Ceylon, tropics of the old world.

FIBRE :—A strong silky fibre is extracted from the stems. Close spacing while sowing, ensures straight erect stems, which yield the best fibre. Crop is ready for cutting in about 5 to 6 months from sowing. 1 to 1½ tons of prepared fibre should be obtained from an area of one acre. Retting in water takes about 8-10 days; the fibre is then cleansed by hand, then dried and bleached in the sun. It is employed in Madras by local people for cordage. The fibre is also said to be employed for the manufacture of gunnies.

*See*—Medicinal Plants.

## HIBISCUS SURATTENSIS Linn.

FAM.—Malvaceæ.

COM. NS. :—No names.

CHAR. :—An erect or trailing plant; sparsely prickly. *L.*—from orbicular-ovate to palmately, 3-5 lobed. *Fl.*—yellow with dark-purple centre. *Fr.*—ovoid, hairy.

DISTR. :—A rare plant. Konkan, Kanara, Tropical Asia, Africa, Australia.

FIBRE :—Bark yields a strong fibre.

## HIBISCUS TILIACEUS Linn.

FAM.—Malvaceæ.

COM. NS. :—*K.* Belli-Pata.

CHAR. :—A much branched small evergreen tree; young parts densely tomentose, 7·5-9 m. high, with a girth of 0·9 m. *L.*—10·4-15·6 × 10·4-13 cm., roundish, cordate-ovate, shortly and abruptly acuminate, entire, crenulate, rarely lobed, long petioled, leathery, glabrous above, hoary-tomentose and sometimes glandular beneath, 7-nerved. Stipules foliaceous, broadly-oblong, deciduous. *Fl.*—large, yellow, with a dark crimson eye. Peduncles short, woody, terminal, with stipule-like deciduous bracts at the base. Bracteoles (epicalyx) 7-14, linear-lanceolate connate above the middle, shorter or about the length of the calyx. Calyx 2·6 cm., broadly-campanulate, 5-partite; divisions lanceolate, pubescent externally. Corolla 2-3 times the size of the calyx, campanulate. Staminal tube 4 cm. Ovary-5-celled. Styles 5 connate at the base; stigma capitate. *Fr.*—capsule shorter than the calyx, oblong, acuminate, pentagonal, densely hairy, 5-valved, spuriously 10-celled. Seeds slightly pilose. *Fl. t.*—Jan. *Fr. t.*—Mar.-Apr.

DISTR. :—Konkan and N. Kanara, along the sea-coast; also along the banks of tidal rivers near the sea; coasts of E. and W. Peninsula, Bengal, Sundribans : Ceylon.

FIBRE :—The bark yields a strong fibre used in Bengal for ropes and cordage. In Ceylon it is used for mats. It should be useful for paper-making (Gamble). It is said to gain in strength when tarred. The power of endurance under water is therefore a point of great importance.

English Hemp, Indian Hemp, Sann Hemp and Jute when tarred prove less strong than the above.

### HIBISCUS VITIFOLIUS Linn.

FAM.—Malvaceæ.

COM. NS. :—*M.* Van-Kapas.

CHAR. :—A herbaceous, more or less hairy plant. *L.*—cordate, 3-5 lobed, serrate. *Fl.*—sulphur-yellow with a purple centre. *Fr.*—hairy, five winged.

DISTR. :—Konkan, Hills of Deccan, S. M. Country : Ceylon, Tropical Africa, Australia.

FIBRE :—The bark yields a strong silvery fibre.

Barks of many other Hibiscus species yield fibre.

### HOLOSTEMMA RHEEDIANUM Spreng.

FAM.—Asclepiadaceæ.

COM. NS. :—*M.* Shidodi, Tultuli.

CHAR. :—A large twining shrub; stems much branched, shining. *L.*—thick, ovate-oblong, base deeply cordate. *Fl.*—fragrant, purplish-crimson inside, frosted-white or pale pink outside. *Fr.*—linear oblong, cylindric, tapering to a blunt point.

DISTR. :—Common in hedges ; Konkan, Deccan ; Tropital Himalayas, W. Peninsula : Burma, Ceylon.

FIBRE :—The fibres are fine and silky and are adapted for cordage and for paper-manufacture.

*See*—Fodder Plants.

### HOYA PENDULA Wight.

FAM.—Asclepiadaceæ.

COM. NS. :—No names.

CHAR. :—A twining shrub ; *L.*—ovate ; *Fl.*—white, drooping, corolla lobes silky.

DISTR. :—Hills of Kolaba district, Southern Konkan ; Western Peninsula.

FIBRE :—Stem yields excellent fibre.

### ICHNOCARPUS FRUTESCENS R. Br.

FAM.—Apocynaceæ.

COM. NS. :—*H.* Kalidudhi, Siamalata ; *K.* Gorwiballi, Karihambu , *M.* Kantebhovari, Krishnasariva ; *Sk.* Bhadra, Chandangopa, Gopini, Kalaghantika, Sariva.

CHAR. :—A large twining shrub ; young branches finely fulvous tomentose ; *L.*—4·5-7 × 2-3·8 cm., elliptic oblong, glabrous above, slightly pubescent and pale beneath, base rounded ; *Fl.*—in axillary and terminal, rusty pubescent, trichotomous cymes, greenish white, numerous ; *C.*—tube with narrow portion below, middle portion much inflated, upper constricted, lobes with white hairs on the upper side ; *Fr.*—follicle, 10-15 × 4 cm., straight or slightly curved, very slender, cylindric ; *Sd.*—linear, black with white scanty coma : *Fl. t.*—Nov.-Dec.

DISTR. :—More or less throughout India, Ceylon, Java, Australia.

FIBRE :—Bark yields a good fibre.

### KYDIA CALYCINA Roxb.

FAM.—Malvaceæ.

COM. NS. :—*H.* Choupultea, Patari, Patha, Pola ; *K.* Bellaka, Billubhendy ; *M.* Bhendy, Ranbhendy, Warung.

CHAR. :—A small or moderate-sized tree, 7·5-12 m. high, girth 9-1·2 m. *Bark* ·67 cm. thick, grey, peels off in irregular flakes. All young parts and inflorescence more or less stellate-tomentose or velvety. *L.*—10·4-13 × 7·8-10·4 cm., cordate, roundish or ovate-obtuse, acute, or acuminate, palmately 5-7-nerved at the base, more

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or less deeply lobed, middle lobe longest, dark coloured above, pale and velvety beneath. Petiole 2·6-5·2 cm. *Fl.*—polygamous, white, pink, or sometimes pale-yellow, in axillary and terminal panicles. Bracteoles 4-6, nearly as long as the calyx, ultimately enlarging. Calyx campanulate, 5-lobed and persistent. Petals 5, obcordate, oblique, longer than the calyx. Stamens monadelphous, the tube divided to about the middle in to 5 bundles, each nearing 3-8 reniform anthers. Ovary 3-celled. Style 3-cleft; stigma peltate. *Fr.*—capsule, globose, 3-valved, opening loculicidally. Seeds reniform, furrowed, stellately pubescent. *Fl. t.*—July-Oct. *Fr. t.*—cold season onwards. Sheds its leaves in Feb.; new foliage Apr.-May.

DISTR. :—Common in the deciduous forests on the N. Kanara and Konkan ghats; also found on the dry Deccan hills of the Poona district. In deciduous forests throughout India and Burma and not in the arid regions. Common in the Sub-Himalayan tract.

FIBRE :—The inner bark yields a bast fibre used for coarse ropes. It is a good strong fibre used for making elephant drag-ropes.

*See*—Fodder Plants.

## LAGERSTROEMIA PARVIFLORA Linn.

FAM.—Lythraceæ.

COM. NS. :—*G.* Kakria; *H.* Adhauri, Bakli, Katdhaura, Lendya Seina; *K.* Chununge, Ventaku; *M.* Bondara, Lendi, Nandi, Sokutia; *Tr.* Lendi.

CHAR. :—A large deciduous tree, 15-12 m. high; girth 1·8-2·4 m. Bark light brown, thin, exfoliating in long, thin, woody scales. Glabrous, branches and young leaves are pubescent at least on midrib. L.—5-9 cm., oblong, opposite, coriaceous, sessile or shortly petiolates, rounded at the base, acute or acuminate-obtuse, glaucous beneath. *Fl.*—white, fragrant on slender pedicels, forming lax axillary or terminal panicles. *Calyx* glabrous or minutely-downy, not ribbed; lobes 6-7, ultimately erect, adpressed to the fruit. Petals clawed crumpled. The 6 outer stamens much longer than the inner ones. *Fr.*—capsule, oblong or obovate-oblong, 1·3-2·5 cm. long, 3-4 celled. Seeds with a terminal wing. *Fl. t.*—Apr.-June. *Fr. t.*—rainy season. Sheds leaves Mar.-Apr.; new leaves—May. The tree often produces burrs especially when injured. Large trees are often hollow in the centre.

DISTR. :—Throughout the State in deciduous forests from the coast inland; Konkan, Deccan hills; S. M. Country (Belgaum), base of the W. Himalayas, W. Peninsula.

FIBRE :—The bark yields a fibre which is employed in Chota Nagpur for the manufacture of ropes.

*See*—Dyes and Tans, Gums and Resins, Fodder Plants.

## LASIOSIPHON ERIOCEPHALUS Dcne.

FAM.—Thymeæaceæ.

COM. NS. :—*E.* Wooly-headed gnidia; *K.* Kukurgal, Mukute, Rami; *M.* Rametta.

CHAR. :—A much branched, large shrub or a small tree attaining height up to 7·5 m. in good situations. *Bark* mottled, smooth, inner bark fibrous. *L.*—opposite or scattered, sub-sessile, 5-7·5 ×2-2·5 cm., oblong-lanceolate, glabrous above, silky beneath. *Fl.*—in erect dense terminal heads, 2·5-3·8 cm. diameter, surrounded at the base by an involucre of silky villous bracts, yellow, perianth tube densely silky villous, lobes 4, oblong, flat, with a linear 2-fid scale at each division. *Fr.*—ellipsoid-oblong, pointed enclosed in the perianth. *Fl. t.*—Dec.-May (Cooke), Oct.-Feb. (Talbot). *Fr. t.*—Mar.-Apr. (Talbot).

DISTR. :—Western peninsula on the ghats from the Konkan southwards. Common on the Supa ghats in deciduous forests. Very common at Mahabaleshwar, Matheran, Bengal: Ceylon.

FIBRE :—The inner bark yields a good fibre.

*See*—Medicinal Plants, Poisonous Plants and Fish Poisons.

## LUFFA ACUTANGULA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Ridge-gourd; *G.* Turai; *K.* Hirikai; *M.* Dodka.

CHAR. :—A large climber; stems five angled; tendrils, 3-fid. *L.*—cordate, rough, 5-7 angled, pale-green; *Fl.*—yellow, male and female. Male in 12-20; flowered racemes. Female solitary; *Fr.*—clavate-oblong, longitudinally, ribbed with 10 sharp angles. var. *amara* C. B. Clarke—Smaller in every respect. Fruit and the whole plant bitter.

DISTR. :—Extensively cultivated in gardens and fields, also found wild in S. M. Country and Kanara. Var.—amara common in hedges in the rains. Konkan. S. M. Country, Gujarat.

FIBRE :—The fibrous coat of the nature fruit forms a cheap and efficient flesh-brush. This is also used by natives for sizing paper.

*See*—Medicinal Plants, Oils, Vegetables.

## LUFFA ÆGYPTICA Mill.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Sponge-gourd; G. Turia; *K.* Tiprikayi; *M.* Ghosale.

CHAR. :—Like the preceding, except that the fruit is cylindric or somewhat trigonous, blunt at the end, marked with longitudinal lines.

DISTR. :—Extensively cultivated in gardens and fields.

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FIBRE :—The dry fruit which is interwoven with a net-work of fibres is used as a flesh brush. It is produced largely in Japan for export.

*See*—Oils, Vegetables.

## MALACHRA CAPITATA Linn.

FAM.—Malvaceæ.

COM. NS. :—*M*. Ranbhendi, Vanbhendi.

CHAR. :—A coarsely hispid annual. *L.*—orbicular and rather angled. *Fl.*—small, yellow in axillary heads. *Fr.*—nearly globose, depressed.

DISTR. :—Very common in waste places in the island of Bombay, and especially in the marshy, low lying areas. Though completely naturalished in many places in India, the plant is not indigenous. It was introduced from Brazil by Nimmo as a fibre plant.

FIBRE :—The plant produces an excellent long fibre. It has a silvery appearance with a peculiar lustre and is almost as soft as silk. In passing the fibre through machinery damped with oil and water, as is commonly done with Konkan Jute, yarn is produced strong enough and nearly equal to that made from the second quality of Bengal jute. If the plant is carefully grown and looked after, the fibre would, no doubt, rank fully equal to Bengal and Bombay Jute. But it is not so valuable for spinning as jute, being harsh and lacking the forked ends of the latter. The fibre seems well worthy of investigation.

## MELOCHIA VELUTINA Bedd.

FAM.—Sterculiaceæ.

COM. NS. :—*M*. Methuri.

CHAR. :—A tall shrub or a small tree 6-9 m. high, Young parts stellate-pubescent. *Bark* grey, rough, with small horizonatal fissures. *L.*—10·4 × 7·8 cm. or larger, suborbicular, subcordate, cuminate, 5-7 nerved, more or less deeply serrate, thinly stellate-pubescent or glabrescent above, softly velvety-tomentose beneath. Petiole long, tomentose. Stipules leafy, broadly-cordate, more or less pubescent. *Fl.*—small, pale, rose-coloured, on very short, tomentose pedicels, arranged in terminal and axillary, many-flowered, corymbose panicles. Calyx campanulate, 5-lobed; lobes connate to about the middle, greyish, tomentose. Petals 5, twice the length of the sepals. Stamens 5, opposite to the petals, united at the base into a short tube, and inserted into a lobed disc; filaments flat; anthers introrse, 2-celled. Ovary sessile 5-celled, Styles 5, free or connate at the base. *Fr.*—capsule, oblong, 1·34 cm., deeply 5-lobed, hirsute. Seeds solitary in each cell, brown, smooth, with a wing at the upper extremity. *Fl. t.*—cold season. *Fr. t.*—hot season, when leaves are partially shed.

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DISTR. :—This ornamental flowering tree is cultivated in gardens throughout India, from N. W. Provinces to the Konkan. It is found in wild state in hotter parts. In the Bombay State, it is found wild at Bassein, Khandala and Belgaum.

FIBRE :—The bark yields a strong fibre, called in the Andamans *Betina-da.* Stout cord is manufactured from this and used to weave turtle nets in the Andamans.

### MELIA AZEDARCHTA Linn.

FAM.—Meliaceæ.

COM. NS. :—*E.* Bastard-cedar, Bead tree, Persian Lilac ; *G.* Bakan Limbado ; *H.* Bakain, Betain, Diekna, Drek ; *K.* Bevu, Chickbevu, Heb-bevu, *M.* Padari, Pejri.

CHAR. :—A deciduous tree, 12-15 m. high, girth 1·8 m. *Bark* grey or greyish-brown, with long shallow vertical fissures. Young parts and inflorescence minutely puberulous. *L.*—23·4-48·8 cm. long, bipinnate, occasionally tripinnate, with or without an odd one, opposite, sub-opposite or alternate. *L.*—4-7·8 × 1·34-3·2 cm., ovate or lanceolate, unequal, acuminate at the apex and more or less oblique at the base, serrate or entire at the upper end, very shortly petioluled. *Fl.*—usually 5-merous, pale lilac, small, honey-scented, on short, slender pedicels, in solitary, more or less puberulous axillary panicles, shorter than the leaves. *Calyx* deeply cleft, lobes oblong-lanceolate. Petals puberulous. Staminal tube purple, glabrous outside, many-toothed at the tip. Ovary 5-celled. Stigma 5-furrowed. *Fr.*—drupe, sub-globose, yellow when ripe, with 5 or fewer cells and seeds. *Fl. t.*—Feb.-Mar., sometimes throughout the year. *Fr. t.*—Mar.-Apr. Sheds leaves Feb.-Apr. ; new leaves end of hot season.

DISTR. :—Commonly cultivated throughout India. Indigenous in the Jhelum valley in Kashmir. Said to grow wild in sub-Himalayan tract ; also wild in Baluchistan, Burma and Indian Archipelago.

FIBRE :—The bark yields a fibre of little economic value but is commonly employed in the local manufacture of ropes. It would never pay to extract this fibre for commercial purposes since the trees take years to grow and would be killed by wholesale process of decortication.

*See*—Medicinal Plants, Oils, Fodder Plants, Sacred Plants.

### MORINGA OLEIFERA Lam.

### (MORINGA PTERIGOSPERMA (Gærtn.)

FAM.—Moringaceæ.

COM. NS. :—*E.* Drum-stick tree, Indian horse-radish ; *G.* Sargavo, Seglo ; *H.* Canjna, Senjana, Senja ; *K.* Kochka, Nuggi ; *M.* Shevga, Shekat.

CAR. :–A tree, 4·5-7·5 m. high, girth 1·2-1 m. *Bark* 2·5 cm. thick, grey, corky, with longitudinal cracks. Young parts tomentose. *L.*–0·3-·6 m. long, alternate, twice or usually thrice pinnate; petiole sheathing at the base; pinnæ 4-6 pairs. Pinnules 6-9 pairs, opposite, elliptic, or obovate on slender petiolules; glands between each pair of pinnæ. *Fl.*–2·5 cm. diam., white, honey-scented, arranged in panicles spreading at the ends of branches. Sepals linear-lanceolate. Petals linear-spathulate. Fertile filaments hairy at the base. Ovary villous. *Fr.*–pod, 23-46 cm., pendulous, with 9 longitudinal ribs. Seeds 3-gonous, winged at the angles. *Fl. t.*–Jan.-Apr. *Fr. t.*–Apr. onwards. Sheds leaves Dec.-Jan. New leaves–Mar.-Apr.

DISTR. :–Wild in the sub-Himalayan tract from the Chenab to the Sarada; also in Cutch forests. Cultivated in fields and gardens all over the State and throughout India: Burma and Ceylon.

FIBRE :–The bark yields a coarse fibre from which mats, paper or cordage might be prepared.

*See*–Medicinal Plants, Oils, Gums and Resins, Vegetables.

## MORUS ALBA Linn.

FAM.–Moraceæ.

COM. NS. :–*E.* White Mulberry; *H.* Chinni, Chun, Tul, Tulklu, Tut; *M.* Tuti; *Tr.* Mulberry.

CHAR. :–A small or moderate-sized deciduous glabrous tree, 9-12 m. high; girth 1·2-2·4 m. *Bark* brown, rather rough. Branchlets, petioles and underside of leaves slightly pubescent. *L.*–5-7·5 cm., ovate, acute or acuminate, cordate at the base, dentate or variously lobed, 3-nerved, petiole 1·3-2·5 cm. long. *Fl.*–monoecious, the male and the female often on distinct branches. *Fr.*–colour various from white to purple. *Fl. t.*–Mar.-Apr. *Fr. t.*–rainy season. Sheds leaves during the cold season; renews leaves Feb.-Apr.

DISTR. :–Cultivated in gardens in the State; cultivated in Northern India and up to 3,300 m. in the Himalayas. Indigenous in Northern and Western Asia.

FIBRE :–The bark of mulberry seems to have been employed in China from very early times for paper-making. The fibre from the shoots might yield good half-stuff for the paper-maker. The twigs are used in many localities, on account of their toughness and strength for building bundles of fuels, loads, etc.

*See*–Fruit Trees.

## MORUS INDICA Linn.

FAM.–Moraceæ.

COM. NS. :–*E.* White-mulberry; *G.* Shetur; *H.* Shetur, Siatut, Tut, Tulri; *K.* Kambati, Karihannu; *M.* Ambat, Tut.

CHAR. :—A deciduous shrub or a small tree, 6-7·5 m. high, girth 40-45 cm. Glabrous, young parts sparingly pubescent. *L.*—5-12·5 cm. on petiole 1·3-5 cm. long, ovate, acuminate, coarsely and unequally serrate, sometimes lobed, 3-nerved. *Fl.*—male spikes 1·3 cm. long, axillary, on slender peduncles. Female spikes shorter, on slender peduncles. *Fr.*—globose or ovoid, small, purplish-black. *Fl. t.*—Mar.-June. *Fr.* t.—June-Aug.

DISTR. :—Wild and cultivated; very sparingly cultivated in the Deccan; common about villages in N. Kanara. Wild in sub-Himalayan tract from the Sutlej eastwards; outer hills of the Punjab and the valley of Sikkim. Cultivated largely in Bengal and Burma and sparingly in W. Peninsula.

FIBRE :—Same as the preceding.

*See*—Medicinal Plants, Fodder Plants.

### MUSA ROSACEA Jacq.

FAM.—Musaceæ.

COM. NS. :—*M.* Rankela.

CHAR. :—Stem slender, cylindric, ·9-1·5 m. high ; root perennial. *L.*—linear oblong. *Fl.*—in drooping or erect, short spikes; bracts few flowered, lilac or reddish. *Fr.*—linear oblong, obscurely 4-5 angled, of the size of the man's finger, firm, not edible.

DISTR. :—Grows in almost inaccessible places on the sides of precipitous crags in the Konkan hills; Eastern Himalaya, Chota Nagpur, Western Peninsula; Java.

FIBRE :—The outer layers of the leaf-sheaths yield fibre.

### MUSA SAPIENTUM O. Kuntz.

FAM.—Musaceæ.

COM. NS. :—*E.* Adam's Fig, Banana, Plantain; *G.* Kela; *H.* Kela, Maoz kela; *K.* Bale; *M.* Kela; *Sk.* Dirghapatra, Kadali, Rambha, Urustambha.

CHAR. :—A tree-like succulent herb with false stem formed by the sheaths of leaves; *L.*—very large; *Fl.*—in decurved spadix; *Fr.*—fleshy, oblong, cultivated all over in coastal and ghat districts and in small gardens near the bungalows.

DISTR. :—Indigenous to Bihar and E. Himalaya up to 1,200 m., Ceylon; cultivated throughout India and the Tropics.

FIBRE :—Leaf-sheaths yield fine white fibre of considerable length and strength. The ordinary method of obtaining the fibre is by scraping the sheathing leaf-stalks with a piece of iron and

**SECTION 1.**

**Fibre Plants.**

subsequently washing it to free it from pulp; but if the stem, previously cut longitudinally into four parts, is crushed between proper rollers, a much better quality of fibre can be had; each tree being calculated to yield about 4 lbs. of it. This fibre is fitted for conversion into straight ropes of considerable strength; a rope made from it subtaining 864 lbs., as against 924 lbs., borne by similar one of pine-apple fibre. The fibre has long been used in India for cordage, mats and to a smaller extent for making coarse paper. The outer fibre may be converted into a useful kind of coarse canvas and more delicate inner fibre most probably into finner fabrics. The combings of the fibre can be turned to use for making paper and also a good substitute for horse-hair for stuffiing purposes. The peduncle or core can also be made to yield material for paper-making.

*See*—Medicinal Plants, Fruit Trees, Dyes and Tans, Sacred Plants.

### MUSA SUPERBA Roxb.

FAM.—Musaceæ.

COM. NS. :—*M.* Chaveni.

CAR. :—Whole plant 3-3·6 m. high; trunk not stoloniferous. 2·1-2·4 m. in circumference, narrowed to ·9 m. below the leaves. *L.*—large, oblong; *Fl.*—arranged in spikes which are at first globose, finally drooping; bracts orbicular, long and broad, dull claret-brown. *Fr.*—small, oblong, nearly dry when ripe.

DISTR. :—Widely spread throughout the Western Ghats.

FIBRE :—The plant yields a fibre similar to that of the last species.

### OCIMUM BASILICUM Linn.

FAM.—Labiaæ.

COM. NS. :—*E.* Common sweet basil; *G.* Damaro, Nasabo, Sabja; *H.* Bahari, Barbar, Rihan, Sabzah; *K.* Ramkasturi, Sajjebija; *M.* Sabja, Tukhamariya; *Sk.* Ajagandhika, Barbar, Surabhi, Surasa, Tungi, Manjarki.

CHAR. :—An erect herb 0·6-0·9 m. high; glabrous or hispidly pubescent; stems and branches green or purplish; *L.*—ovate, acute, entire, toothed or lobed; *Fl.*—in whorled racemes; terminal raceme longer than the lateral; bracts stalked; *C.*—2-lipped, 8-13 mm. long, white, pink or purplish, glabrous or pubescent. *Fr.*—nutlets about 2 mm. long, ellipsoid, black and pitted.

*Var.*—thyrsiflora, purple stem, pink flowers in thyrsoid racemes.

DISTR. :—Indigenous on the lower hills of the Punjab; cultivated throughout the greater part of India, Ceylon, Burma.

FIBRE :—The plants yield a strong fibre which is employed for rope-making.

*See*—Oils.

## ODINA WODIER Roxb.

## (LANNAÆ GRANDIS A. Rish.)

FAM.—Anacardiaceæ.

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**Fibre Plants.**

COM. NS. :—*H.* Ginyan, Kimul, Mogena; *K.* Gojal, Punil, Shimti; *M.* Moi, Moja, Shimbat, Shimti.

CHAR. :—A moderate-sized or large deciduous tree, 12-15 m. high, girth 1·5-2·4 m. *Bark* 1·3 cm. thick, grey, compact, smooth, exfoliating in small irregular plates, inner bark red, mucilaginous. Young parts and inflorescence covered with stellate tomentum. *L.*—31-47 cm., unequally pinnate near the ends of branches. Leaflets 7-9, 5-15 × 1·3 cm., oblong-ovate, caudate-acuminate, entire, membranous, glabrous, sub-sessile, the terminal one long petiolulate. Racemes slender; male compound, long; female simple and short. *Fl.*—tetramerous, purplish or greenish-yellow, on short pedicels. Bracts ciliate. Sepals obtuse, ciliate. Petals twice as long, oblong, coriaceous, spreading. Stamens in male flowers as long as the petals. Ovary, sessile, 1-celled. Fr.—drupe, kidney-shaped, red or purple when ripe, size of a pea. *Fl. t.*—Feb.-Mar. *Fr. t.*—hot season. Remains leafless from Feb.-June. On the east side of the Peninsula in leaf almost throughout the whole year; ugly when leafless but handsome in full foliage.

DISTR. :—Common throughout the State in deciduous forests. Thoughout the hotter parts of India. Lower Himalayas and the sub-Himalayan forests, Assam, Bengal, Madras, Madhya Bharat, South India: Burma, Ceylon and Andamans. Very commonly planted.

FIBRE :—The bark yields a good, although coarse, fibre used for cordage.

*See*—Dyes and Tans, Gums and Resins, Fodder Plants.

## OPUNTIA NIGRICANS Haw.

FAM.—Çactaceæ.

COM. NS. :—*E.* Prickly pear, Slipper thorn; *G.* Chorhothalo, Zhoratheylo; *H.* Hathathoria, Nagaphani; *K.* Mullugalli, Nagdali; *M.* Phadyanivdung, Nagaphana, Sher; *Sk.*—Nagaphana, Nagadru, Snuka, Vajrakantaka.

CHAR. :—A woody shrub branched from the base, 3 m. or more in height; *L.*—7·5 mm. long, subulate, recurved, reddish at the tips, Joints variable in size, about 18-30 × 10-18 cm., abovate or elliptic, rather thin dull bluish-green. Areoles bearing about 4-5 up to 10 slender, straight prickles, largest 3·5 cm. long; glochidia hidden among the woolly hairs; rusty brown; *Fl.*—5 cm. across, yellow or orange; perianth rotate, outer segments ovate red in the centre, yellow at the edges, inner spathulate ; *Fr.*—berry, pyriform, angular or warty, bearing tufts of glochidia and a few prickles, reddish purple when ripe.

DISTR. :—Probably indigenous in Mexico ; introduced into India.

FIBRE :—A coarse kind of fibre can be obtained, which has been suggested, might prove useful as a paper material.

*See*—Fodder Plants.

## OUGEINIA DALBERIOIDES Benth.

FAM.—Papilionaceæ.

COM. NS. :—*H.* Sandan, Tinnas, Timsa ; *K.* Betta honne, Kari mutal ; *M.* Kala palas, Tiwas ; *Tr.* Sandan.

CHAR. :—A moderate-sized deciduous tree, 6-12 m. high, girth ·9-2·1 m. ; trunk short, erect. *Bark* light brown, sometimes with bluish patches, with regular longitudinal and horizontal cracks. Branches terets, slender. *L.*—about 31 cm. long, ternate, alternate, stipulate, petioled. Leaflets coriaceous, glabrous or pubescent below, wavy ; terminal leaflet 7·5-15 × 5-7·5 cm., roundish or obovate ; lateral, 10 × 7·5 cm. opposite, oblique-oval, obtuse, entire or crenate. *Fl.*—numerous, white or pale-rose, fragrant, on slender pedicels forming short, fascicled racemes. Calyx sub-bilabiate. *Fr.*—pod, 5-7·5 cm., linear-oblong, obtuse, contracted between the seeds. Seeds 2-5. *Fl. t.*—Mar.-May. *Fr. t.*—June.

DISTR. :—Throughout the State in deciduous forests ; fairly common in the forests of Yellapur (N. Kanara), northern and central India, Lower Himalayas from the Jhelum to Bhutan up to 1,500 m. ; Bihar, Chota Nagpur, Orissa, and the Circars down to the Godavari ; Occasional in Mysore and the Nilgiris.

FIBRE :—The bark yields rough, coarse fibre.

*See*—Gums and Resins, Poisonous Plants and Fish Poisons, Fodder Plants.

## PANDANUS ODORATISSIMUS Linn.

FAM.—Pandanaceæ.

COM. NS. :—*E.* Screw pine, Umbrella Tree ; *G.* Kewoda ; *H.* Gogandhul, Keora, Ketgi ; *K.* Kedige, Ketaki, Mundige ; *M.* Kevada ; *Sk.* Champa-pushpa, Gandha-pushpa, Ketaka, Giripriva, Dhulipushpika.

CHAR. :—A shrub up to 0·6 m. high, rarely erect ; stem supported by aerial roots ; *L.*—glaucous green, 0·9-1·5 m. long, coriaceous ensiform, margins and midrib spiny ; *Fl.*—diœcious ; *male flower* spadix with many cylindric spikes enclosed in long, white or yellow, fragrant spikes ; *Female flower* spadix solitary ; *Fr.*—oblong or globose, yellow or red ; drupes 50-80 each consisting of 5 to 12 carpels.

DISTR. :—Sea-coast of Indian Peninsula on both sides, Sundarbans, Burma, Andamans; often planted.

FIBRE :—The fibres are obtained from the leaves which are cut for this purpose every second year. The fibre is long, white and glossy; used for making mattings and cordage and in S. India for the larger kinds of hunting nets and for drag ropes of large fishing nets. In Mauritius the fibre is employed for making sacks for coffee, sugar and grain. The roots are also fibrous and are used by basket-makers for binding their work with. When cut into lengths and beaten out they are very commonly used as brushes for painting and white-washing. The fibres are said to be also good for paper-making. Young leaves of this are used in Philippines for making fine Manilla hats.

*See*—Oils, Sacred Plants.

### PARKINSONIA ACULEATA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*E.* Jerusalem thorn; *H.* Kikar; *M.* Vedi-babul.

CHAR. :—A small tree armed with sharp woody spines, which represent the rachises of the 2-pinnate leaves. Pinnæ 1-3 pairs; leaflets numerous, minute. *Fl.*—yellow in axillary racemes. *Pods* monoliform.

DISTR. :—A native of Tropical America, often grown as hedge plant, almost naturalized in the Bombay State and more or less so throughout India.

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FIBRE :—It yields a fibre of beautiful white colour but is short and somewhat brittle. It might be made use of for paper-making.

### PAVONIA ADORATA Willd.

FAM.—Malvaceæ.

COM. NS. :—*G.* Kalowalo; *H.* Sugandha-bala; *K.* Balarakkarigida, Mudivala; *M.* Kala-vala, Sugandha-bala; *Sk.* Bala, Kachamoda, Udichya, Varapinga.

CHAR. :—An erect branching annual, 45-90 cm. high; stems and branches ciscous pubescent; *L.*—2·5-5-7 cm. long roundish-ovate, cordate, shallowly 3-5 lobed, dentate or lower ones entire, hairy, felted and whitish beneath; *Fl.*—solitary, clustered at the ends of branches; involucral bracts 10-12, linear, with long, white hairs, pink, twice the length of calyx; *Fr.*—carpels glabrous, not winged; *Fl. t.*—Oct.

DISTR. :—N. W. India, Bundelkhand, W. Rajastan, Bengal, N. Circars, Karnatak, Sind, Baluchistan, Ceylon.

FIBRE :—The plant yields a fibre of an excellent quality. It is of a finer texture, softer, whiter and stands a good chance of coming into commercial use as a substitute for Hibiscus and even for jute. It deserves to be more carefully cultivated and the fibre throughly tested.

### PAVONIA ZEYLANICA Cav.

FAM.—Malvaceæ.

COM. NS. :—*H.* Bala ; *K.* Bal-gidda ; *M.* Bala.

CHAR. :—A perennial undershrub. *L.*—roundish, cordate or truncate at the base, 3 lobed, dentate, hairy. *Fl.*—pink ; involucral bracts 8-12 ; carpels rounded at the back, wedge shaped, wrinkled, narrowly winged.

DISTR. :—Deccan, Gujarat ; Sind, Tropical Africa, Mauritius, Ceylon.

FIBRE :—Same as the preceding.

### PENNISETUM ALOPECUROS Nees.

FAM.—Gramineæ.

COM. NS. :—*M.* Mol.

CHAR. :—A perennial grass. Stems ·6-·9 m. high, stout, erect, densely tufted below, branched above ; branches erect. *L.*—very narrow with usually a tuft of soft hairs at the base. Racemes spike-like.

DISTR. :—Deccan common, S. M. Country ; Rajastan, Western Peninsula, Madhya Bharat.

FIBRE :—The strong, tough leaves are used on Mount Abu for making ropes. The leaves and inflorences are used for making brooms.

### PHŒNIX SYLVESTRIS Roxb.

FAM.—Palmeæ.

COM. NS. :—*E.* Date-sugar or Indian wine or wild date palm ; *G.* Kujuri, Kherk, Tadi ; *H.* Khaji, Khajuri, Salma, Sendhi, Thekil ; *K.* Ichalamara, Kall-challu, Kallu ; *M.* Boichandy, Shindi, CHAR. :—A tall graceful palm, 9-15 m. high; girth ·9-1·5 Crown thick, hemispherical; trunk clothed with persistent scars of fallen leaves or bases of petioles. *L.*—2·1-4·5 m. greyish-green, pinnate; petiole short and dilated at the base; pinnæ 15-45 cm. alternate, opposite, rigid. *Fl.*—small, sessile; colyx and corolla 3-toothed or parted in both sexes; stamens in male flowers 6, ovary rudimentary; female flowers, carpels 3; male flowers in compact panicles, 15-30 cm. *Fr.*—oblong, reddish-yellow when ripe, about 2·5 cm. long, smooth, supported by the perianth. *Fl. t.*—Jan.-Feb. *Fr. t.*—May and rainy season.

DISTR. :—Moist situations in dry regions; in fairly good quantity in Surat, Sholapur and Poona districts, usually along banks and in beds of streams and water-courses. Tolerably common throughout India, wild or more often cultivated; Bengal, Bihar, Coromandel coast, Rohilkhand, Mysore, Siwalik, outer Himalayas, Mt. Abu.

FIBRE :—The leaves are employed for making bags, baskets and mats. The leaf-stalks are beaten and twisted into ropes which are employed for drawing water from wells. The fibre obtained from leaf is plentiful, soft and bleaches well and is admirably adapted for paper-making (Lisboa). The leaves being bleached by dipping for about fifteen minutes in boiling water, are made into hats and fancy baskets in Ceylon.

*See*—Medicinal Plants, Famine Plants.

### PHRAGMITES ROXBURGHII Seeud.

FAM.—Gramineæ.

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COM. NS. :—*H.* Narkul.

CHAR. :—A tall grass; stems reaching 3 m. high, covered with the leaf sheaths. L.—close, linear, broad. Panicle ·3-·6 m. long, erect.

DISTR. :—Not common in the Bombay State. Deccan; More or less throughout India: Sind, Tropical Asia, Afghanistan, Japan, Africa, Australia.

FIBRE :—Fibre is extracted from the upper part of the stem. The fibre of the flower stalk is used for manufacturing ropes in Kumaon.

### POLYALTHIA LONGIFOLIA Benth.

FAM.—Anonaceæ.

COM. NS. :—*E.* Indian Fir, Mast tree; *H.* Asok, Decadari; *K.* Putrajivi; *M.* Asok, Asuphala.

CHAR. :—A large evergreen tree; entirely glabrous; height up to 15 m. with a girth up to 1·8 m. *Bark* smooth, dark greyish brown. *L.*—13-20 cm. × 2·6-5·2 cm., narrow lanceolate, long acuminate wavy, shining above, pellucid, dotted. *Fl.*—numerous, umbellate, yellowish-green on long slender pedicels. Sepals broad ovate. Petals equal, narrow linear from a broad base. Carpels ovoid, obtuse at both ends. *Fl. t.*—Feb.-May.

Distr. :—Extensively planted in avenues along the roads in the State, and other parts of India. Indigenous in Ceylon.

FIBRE :—The inner bark yields a good fibre.

## PONGAMIA PINNATA Pierre.

### (PONGAMIA GLABRA Vent.)

FAM.—Papilionaceæ.

COM. NS. :—*E.* Indian Beech; *G.* Kanaji, Karanji; *H.* Kanja Karang, Kirmal; *K.* Honge, Huligalli, Karanj-maru; *M.* Karanja.

CHAR. :—A tall almost evergreen tree, with short white or dark cinereous trunk, 15-18 m. high; girth 1·5-2·4 m. *Bark* soft, grey, covered with tubercles. Leaflets 5-7, opposite, oblong or ovate, acute, 5-12·5 cm. long. *Fl.*—mixed white, blue or purple, in peduncled axillary racemes; pedicels with a pair of bracteoles in the middle. Calyx nearly truncate. Corolla much exserted, 1·3 cm. in diam., standard broad, keel obtuse, petals united. *Fr.*—legume, thick, woody, 5 cm. long, 1-2, seeded. *Fl. t.*—May-June. *Fr. t.*—Apr., of the following year.

DISTR. :—Planted and wild. Throughout the State in moist situations along rivers and *nalas* (Deccan). Often planted as a roadside tree. Very common near the sea-coast (Konkan), from the Himalayas to Ceylon and Malacca.

FIBRE :—A coarse bark fibre of a brown colour is extracted in the Salem district. The bark is pressed and rolled by *Pinjaris* into felt.

*See*—Medicinal Plants, Oils.

## RICINUS COMMUNIS Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Caster oil plant, Palma christi; *G.* Divald, Divaligo, Tirki; *H.* Arand, Erand; *K.* Eranda, Haralu, Vardhaman; *M.* Erand; *Sk.* Erand, Chitrabija, Triputiphala, Vardhamana.

DISTR. :—Probably of African origin; widely cultivated in tropical countries.

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**Fibre Plants.**

FIBRE :—An excellent paper-pulp is said to be made from the stems with their bark, the latter containing a fibre, though not of sufficient value to justify its separation. It seems probable that where grown in the vicinity of a paper-mill, it would be more profitable to dispose of stems to paper-makers than to use them as fuel.

*See*—Oils.

## SACCHARUM OFFICINARUM Linn.

FAM.—Gramineæ

COM. NS. :—*E.* Sugarcane ; *G.* Naisakar, Sherdi ; *H.* Ganna, Kumad, Rikhu, Ukh ; *K.* Ingotu, Kabbu, Tanigarbu ; *M.* Us ; *Sk.* Gudakastha, Gudatrina, Ikshu, Madhuyashti, Rasala.

DISTR. :—Grown everywhere in India ; S. Asia is very likely the original home of the species.

FIBRE :—The bagasse of the sugarcane mill has been recommended as a material for the manufacture of paper and sound-proof boards and is said by Stewart to be sometimes made into well-ropes and on the Chenab, to be twisted into rough cordage for tying the logs into rafts.

## SACCHARUM SPONTANEUM Linn.

FAM.—Gramineæ

COM. NS. :—No names.

CHAR. :—A very tall erect grass ; stem erect from a stout root-stock ; solid, smooth, *L.*—linear, rigid, panicle large ; *Fl.*—in feathery inflorescences with silky-whiteness.

DISTR. :—Konkan ; Deccan (along river-banks), S. M. country ; Gujarat ; throughout India ; Sind, Ceylon, S. Europe, warm regions of the old world, E. Australia.

FIBRE :—The culms are made into pens and brooms ; the leaves after being deprived of their soft parts are used to make strings. The whole plant is sometimes used for thatching.

## SALMALIA MALABARICA Schot. & Endl.

## (BOMBAX MALABARICUM D. C.)

FAM.—Bombacaceæ.

COM. NS. :—*E.* The cotton tree, Silk-cotton tree ; *G.* Sawar ; *H.* Pagun, Semul, Semur, Shembal ; *K.* Buruga, Burla, Sauri ; *M.* Savar ; *Tr.* Semul.

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**Fibre Plants.**

CHAR. :—A very large tree; trunk straight; stem generally with large buttresses at the base, branches in whorls of 5-7, spreading nearly horizontally. Height 18-27 m. with a girth 3·6-4·5 m. *Bark* grey, when young with conical prickles with corky base, when old with long irregular vertical cracks. *L.*—digitate, deciduous, 5-7 foliolate; leaflets generally 10·4-20·8 cm. long, elliptic-oblong to oblong-lanceolate, acuminate or cuspidate at the apex, narrow at the base, glabrous, entire; common petiole as long as or longer than the leaflets. *Fl.*—numerous, large, scarlet or occasionally white, on short pedicels, fascicled near the ends of branches. Bracteoles O. Calyx 2·6 cm., long, cup-shaped, thick, coriaceous, irregularly cleft into 3-4 short, obtuse lobes, smooth externally, silk-hairy within. Petals 5, oblong, fleshy, recurved, tomentose externally, pubescent or nearly glabrous inside. Staminal tube shorter than the filaments; the latter thick and shorter than the petals, multi-seriate; 5-innermost divided at the top, each bearing an anther; 10 intermediate ones simple and shorter; the outer numerous and are united into 5-clusters, Anthers reniform, contorted, 1-celled. Ovary 5-Celled. Style clavate; stigmas 5. *Fr.*—capsule, 6-7 in., oblong, blunt, obsoletely 5-angled, woody. 5-valved. Seeds numerous, obovate smooth, enveloped in silky fine wool. *Fl. t.*—Feb.-Mar. *Fr. t.*—Apr.-May. Sheds leaves in Nov. and remains leafless till Apr.

DISTR. :—Common in Gujarat, Konkan and S. M. Country; Sub-Himalayan tract from the Indus eastwards ascending to 1,750 m. Common in both Peninsulas and often cultivated.

FIBRE :—The inner bark of the tree yields a good fibre suitable for cordage. The seeds yield so-called red silk-cotton or Simul cotton. The fibre though strong is too short and too soft to be spun; it is largely used for stuffing pillows, cushions, etc. Smoothness of the cotton prevents cohesion or felting and hence in the textile industries this fibre could only be used to mix with others, imparting a silky gloss to the fabrics. This is known all over as *Indian Kapok* and is similar to *Java Kapok* for use in life-saving appliances and for all other purposes for which the latter is used. This tree is very common in most parts of India and its floss now holds first place in the *Indian Kapok* market, and is exported from this country. The wood is largely used for splints in the match industry.

See—Fodder Plants.

## SANSEVIERIA ZEYLANICA Willd.

FAM.—Liliaceæ.

COM. NS. :—*E.* The Bow-string Hemp. *M.* Naghin, Murrea.

CHAR. :—A herbaceous plant; stem very short. *L.*—about 8-9 in. tuft, succulent, rigid, broad towards the middle, concave or furrowed, pale-green with transverse bands of dark-green, with a spine-like tip. *Fl.*—greenish-white tinged with violet, in fascicles of 3-6 on long racemes.

DISTR. :—Commonly cultivated in gardens as an ornamental plant all over India; said to be indigenous on the Coromandal coast: Ceylon, Java, China, Africa.

FIBRE :—The leaves yield fibre which is very strong, tough and silky-white and much resembles that of the pine-apple. It is used for making thread, twine, ropes, mats, fishing nets and bow- strings. It stands a greater strain than even the Russian Hemp. It is sometimes used for making a fine class of cloth, and is considered very valuable for paper manufacture, for which it has been utilised at Trichinopoly.

## SESBANIA ACULEATA Poir.

FAM.—Papilionaceæ.

COM. NS. :—*H.* Gayanti; *M.* Ran-shevari, Dhaincha.

CHAR. :—An annual of rapid growth, sometimes reaching 2·4 m. in height; stems semi-woody; branches and leaf-rachis, prickly. *L.*—pinnate; leaflets 20-50 pairs. *Fl.*—yellow, with red spots on the standard petal. *Pods* not twisted, beaked.

DISTR. :—Very common in wet places throughout the Konkan and the Deccan. Cosmopolitan in the Tropics of the old-world.

FIBRE :—Stems yield a strong and durable fibre used for ropes and cordage. It is used as a substitute for hemp. It is reckoned to be more durable in water and is, therefore, universally employed for drag-ropes and other cordage about fishing-nets.

## SESBANIA ÆGYPTIACA Poir.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Raysingani; *H.* Janjhan, Jayanti, Rasin; *K.* Jayanti, Jinangi; *M.* Shewari.

CHAR. :—A small evergreen tree, 4·5-6 m. high, girth ·3-·9 m. *Bark* brown, nearly glabrous. *L.*—7·5-15 cm., abruptly pinnate. Leaflets 20--40, 2-2·5 cm. long, linear-oblong, obtuse, with or without a mucro, entire, membranous, pale-green. *Fl.*—yellow, spotted with purple, 6-10 on spreading slender pedicels forming lax axillary drooping racemes. Calyx membranous. Corolla ·7-2 cm. *Fr.*—pod, 15-23 × 2-2·5 lin., torulose, pointed. Seeds 20-30, pale-brown. *Fl. t.*—end of rainy and during cold season.

**SECTION I.**

**Fibre Plants.**

DISTR. :—Rare along nalas and water-courses in N. Kanara; commonly planted in gardens throughout the State as support to betel-vines and as a substitute for bamboos in the drier parts of the Deccan. Plains from the Himalayas to Siam and Ceylon. Throughout the Tropics of the Old-World.

FIBRE :—The bark yields fibre used for making ropes.

*See*—Medicinal Plants, Famine Plants, Fodder Plants.

## SIDA CARPINIFOLIA Linn.

FAM.—Malvaceæ.

COM. NS. :—*G.* Bala; *H.* Bariara, Kareta, Kharanti; *K.* Bhiman-Visha, Kaddi, *M.* Chikna, Pata, Tukti; *Sk.* Bala, Pata, Rajbala.

CHAR. :—A shrub; branches slender, minutely hairy; *L.*—2·5-6·3 cm., long, lanceolate, base rounded, sharply serrate, glabrous; *Fl.*—1-2 in each axil, pedicel jointed about the middle; *C.*—yellow, petals connate at the base with staminal tube; *Fr.*—5-6 mm. diam., carpels 5·9, strongly reticulated, puberulous, dorsal margins toothed; awns 2, linear; *Sd.*—smooth, black; *Fl. t.*—Nov.-Dec.

DISTR. :—Hotter parts of India; in tropical and sub-tropical regions of both the hemispheres.

FIBRE :—Stem yields very tough and strong fibre, which is easily made into ropes and is also fit for manufacturing paper.

## SIDA CORDIFOLIA Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Country Mallow; *G.* Baladana, Kherati; *H.* Barial, Khareti, Kumghi; *K.* Chittu-naratu, Hettutti-gida, Kisangi; *M.* Chikna; *Sk.* Bala, Batyalaka, Jayanti, Prahasa, Samanga, Vatyapushpi.

CHAR. :—An annual or perennial herb or undershrub; softly hairy all over; *L.*—2·5-5 cm. long, cordate, ovate-oblong, crenate, obtuse; *Fl.*—solitary or few together, pedicel jointed much above the middle, yellow; *Fr.*—6-8 mm. diam., carpels 7-10, strongly reticulated; upper margines ciliate, dorsal scabrid; awns 2, linear, scabrid-hairy; *Fl.t.*—Oct.-Nov.

DISTR. :—Tropical and sub-tropical regions of both the hemispheres.

FIBRE :—Same as the preceding. The fibre is fine and white.

## SIDA GLUTINOSA Cav.

FAM.—Malvaceæ.

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Fibre Plants.

COM. NS. :—No names.

CHAR. :—A suberect herb ; sticky hairy. *L.*—small, cordate, ovate, serrate, hairy. Pedicels axillary, several crowded together. *Fl.*—pale-yellow.

DISTR. :—Deccan, Konkan, S. M. Country, Kanara : Widely distributed throughout the tropics of both hemispheres.

FIBRE :—Stems yield valuable fibre.

## SIDA RHOMBIFOLIA Var. retusa Masters.

FAM.—Malvaceæ.

COM. NS. :—*H.* Jangli Methi. *M.* Atibala.

CHAR. :—An erect shrub ; branches hairy. *L.*—on the middle of the stem, obovate, coarsely toothed at top ; dark green above, hairy beneath. *Fl.*—yellow, crowded towards the ends of the branches.

DISTR. :—A comon weed ; Konkan—very common, Deccan, Gujarat, S. M. Country.

FIBRE :—The bark yields a very delicate flaxy fibre. Fibre is strong, fine, round and of excellent spinning properties and is well suited for finest yarns.

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## SIDA SPINOSA Linn.

FAM.—Malvaceæ.

COM. NS. :—*H.* Jangli methi ; *K.* Kadu-menthya ; *M.* Jangli-methi.

CHAR. :—A sub-erect shrub ; minutely hairy. *L.*—elliptic crenate, rounded or narrowed at the top to obtuse triangle, with 1-3 recurved spines beneath the stalk. *Fl.*—pale-yellow.

DISTR. :—Konkan, Deccan, Gujarat : Sind. Tropical and subtropical regions of both hemispheres.

FIBRE :—Stem yields good fibre.

## SIDA VERONICIFOLIA Lam.

FAM.—Malvaceæ.

COM. NS. :—No names.

CHAR. :—A perennial, much branched ; trailing hairy herb. *L.*—cordate, ovate, serrate, sparsely hairy. *Fl.*—pale-yellow, axillary, solitary or twin.

DISTR. :—Common throughout the State on sandy soil. Konkan, Gujarat, S. M. Country : Sind, in tropical and sub-tropical regions of the globe.

FIBRE :—The stem yields more or less fairly good fibre.

## SOYMIDA FEBRIFUGA A Juss.

FAM.—Meliaceæ.

COM. NS. :—*E.* Bastard cedar, Indian Redwood; *H.* Rohan; *K.* Some or Swami-mara, Sumbri; *M.* Lal-chandan, Palara, Rohan.

CHAR. :—A large deciduous tree, 21-24 m. high, girth 2·1-2·4 m. *Bark* bluish-grey or dark-brown, rough, exfoliating in large plates or scales. *L.*—abruptly pinnate, 23-47 cm. long. Leaflets 6-12, 4-13 × 2·7 cm., opposite elliptic or oblong, obtuse at the apex, oblique at the base, on very short petiolules. *Fl.*—greenish-white on short pedicels forming large panicles often equalling the leaves. Calyx deeply 5-cleft. Petals 5, obovate, contorted in bud. Bracts ovate deltoid, small. *Fr.*—capsule, oblong, obovoid, smooth, black when ripe, size of an apple. *F. t.*—Apr.-May. *Fr. t.*—July-Aug. New leaves appear in hot season while part of old leaves are still on the tree.

DISTR. :—Usually on dry stony hills in Gujarat, Khandesh, Belgaum and Dharwar, Madras State, Madhya Bharat; Ceylon.

FIBRE :—The bark yields a strong, red fibre used for making ropes.

*See*—Medicinal Plants, Dyes and Tans.

## SPATHOLOBUS ROXBURGHII Benth.

FAM.—Papilionaceæ.

COM. NS. :—M. Phalsan.

CHAR. :—A woody climber. *L.*—3 foliate; leaflets very large ovate, lateral ones oblique. *Fl.*—small, white or red, 3 together in large panicles. Pod velvety, rich reddish-brown.

DISTR. :—Hills in Salsette and other parts of Konkan; S. India, Ceylon.

FIBRE :—The plant yields a strong, valuable orpe-fibre which are used extensively for tying up faggots and for other forest works. It is now commonly used in Malbar for tying up rice-bundles.

## STEPHEGYNE PARVIFLORA Korth.

FAM.—Rubiaceæ.

**SECTION 1.**

**Fibre Plants.**

COM. NS. :—*H.* Kallam ; *K.* Attaka ; *M.* Kadam.

A large deciduous tree ; growing throughout the State in deciduous forests ; Konkan and Maval Districts.

FIBRE :—The bark yields a cordage fibre.

*See*—Fodder Plants.

## STEREULIA COLORATA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*H.* Bodala ; *M.* Kowshy.

A moderate-sized deciduous tree ; growing throughout deciduous forests in the State.

FIBRE :—The bark yields an inferior fibre sometimes used for ropes.

*See*—Fodder Plants.

## STERCULIA FŒTIDA Linn.

FAM.—Sterculiaceæ.

COM. NS. :—*E.* Bastared-Poon ; Gangh-badam ; *K.* Penari, Sembadi ; *M.* Goldaru, Nagalkuda.

CHAR. :—A large deciduous straight, stout, handsome, stately tree ; branches horizontal, verticillate ; 24-27 m. high, girth 2·4-3 m. Glabrous except the very young leaves and shoots. *Bark* thick, whitish. L.—crowded at the ends of the thick branchlets on petioles, 20·8 cm., digitately 5-9 (II)-foliolate ; leaflets about 15·6 × 5·2 cm., elliptic-oblong or lanceolate, acuminate or cuspidate, entire, shortly petioluled, coriaceous. *Fl.*—polygamous, of a dull crimson colour, rather large, emitting a strong disagreeable smell, in lax, simple or branched racemes, about as long as the petioles ; pedicels shorter than the flower, joined in the middle. Bracteoles minute. Calyx 1·3-2·6 diam., campanulate, deeply 5-cleft, glabrous externally and hairy internally, lobes lanceolate, spreading. Petals none. Staminal column bearing several (12-15) sessile, 2-celled anthers. Carpels 5, villous. Style stalked, curved. *Fr.*—Follicle about 2-4 by 2½ in., glabrous, woody, boat-shaped shortly beaked. Seeds 10-15, large, oblong, black, smooth. *Ft. t.*—Mar.-May. *Fr. t.*—beginning of rainy season. Sheds leaves in hot season.

DISTR. :—Common in Bombay, generally cultivated; found sparingly in wild state, throughout Bombay, Madras and Bengal States; Ceylon and Burma.

FIBRE :—The bark yields fibre.

*See*—Gums and Resins.

## STERCULIA GUTTATA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*K.* Happu, Savage; *M.* Golder, Kukar.

CHAR. :—A large or middle-sized erect tree. Young shoots pubescent. *Bark* ash-coloured, cracked. *L.*—18·2-20·8 × 10·4-13 cm., smooth, shining or scabrid above, very softly villous beneath, oblong ovate, acute or suddenly acuminate, rounded or slightly cordate at the base, entire; petiole round, downy, 5·2-10·4 cm. Bracts lanceolate. *Fl.*—chiefly hermaphrodite, usually in threes on pedicels shorter than flowers, in terminal and axillary, villous racemes. Calyx 5-fid, segments broadly ovate-acute, reflexed densely villous on both sides, of a pale-yellow colour externally, internally of the same colour spotted with purple. Corolla none. Anthers 12. Ovary long-stalked, 3-5-lobed, downy. Etyle curved; stigma 3-5-lobed. *Fr.*—follicle, 1-5, usually 5, each about 7·8 × 5·2 cm., obovoid, villous, of a brilliant red colour. Seeds large, oblong, black. *Fl. t.*—Feb. *Fr. t.*—hot season. Leafless in Feb. Looks very ornamental when covered with red follicles.

DISTR. :—Throughout the forests of the Konkan and N. Kanara usually near moist evergreens. Malbar, Nilgiris, Madras: Ceylon, Andaman Islands and Malacca.

FIBRE :—The bark gives fibre well alapted for cordage and for coarse paper. The fibre is strong and white. Cloth is manufactured from the bark. The tree is felled, its branches lopped, the trunk cut into pieces, about 6 ft. long; a perpendicular incision is made in each, the bark opened, taken off entire, chopped, washed, and dried in the sun. In this State, it is used for clothing.

*See*—Timber.

## STERCULIA URENS Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*G.* Kada, Karai, Kalauri; *H.* Gulu, Gular, Karrai, Tabsi, Tanuku; *K.* Chauri, Chevoli, Kempudole, Savaya; *M.* Kandol, Karai, Kurku, Sarda, Saladhor.

CHAR. :—A large deciduous tree, trunk erect, branches spreading, height 18-21 m., girth 2·4-3 m. *Bark* 1·34 cm., thick, very smooth, white or greenish-grey, exfoliating in large thin irregular paper flakes. *L.*—crowded at the ends of branches, 23·4-31·2 cm., long and broad, cordate at the base, usually 5-lobed; lobes entire, acuminate, membranous or somewhat coriaceous, tomentose beneath, nearly glabrous above; petioles 15·6-23·4 cm. *Fl.*—small, numerous, greenish-yellow, covered with a glutinous yellow tomentum; male and female mixed in much-branched panicles; pedicels furnished at their bases with linear bracts, deciduous after flowering. Calyx companulate, 5-toothed. Corolla none. Filaments 10, alternately longer, united below into a thin sheath which encloses the base of the gynophore. Anthers large, alternately larger. Ovary supported on a thick gynophore. Style short and thick; stigma 5-lobed. *Fr.*—of 5 radiating carpels 7·8 cm. long, orange to bright red, covered with dense tomentum, intermixed with stinging hairs. Seeds 3-6 oblong, black or chestnut coloured. *Fl. t.*—Dec.-Mar. *Fr. t.*—Apr.-May. Leaflets in cold season; young leaves in hot season.

DISTR. :—Common near the coast on rocky soils in the Konkan and N. Kanara. Dry deciduous forest of Deccan districts : (Khandesh Satpudas). Sub-Himalayan tract from the Ganges eastwards in dry deciduous forests throughout the Peninsula; hills of Rajasthan, Madhya Bharat, Bihar. Dry forests of Burma.

FIBRE :—The bark yields fibre used for rope-making.

*See*—Gums and Resins.

## STERCULIA VILLOSA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*H.* Odela, Udal, Udar; *K.* Kaithali, Kalsoga, Pulikisounge, Sage, Savaya, Samikali; *M.* Kuthada, Sarda.

CHAR. :—A moderate-sized deciduous tree; branches few, spreading; attains height 18-21 m. and girth 1·2 × 1·8 m. in South India, towards the north only as a shrub 2·4-3 m. high. *Bark* grey or brown with corky warts. Younger parts tomentose. *L.*—·3-·4 m. each way, crowded at the ends of branches, deeply palmately 5-7 lobed, cordate at the base, 5-7-nerved; lobes oblong, acute or acuminate, sometimes 3-fid, nearly glabrous or thinly stellate-pilose above, tomentose beneath; petioles puberulous, as long as the leaf, enlarged at the tip; stipules oblong, acuminate. *Fl.*—numerous, male and female mixed, yellow, sometimes with pink or orange eye, on slender pubescent pedicels, nearly as long as the calyx, arranged in lax, drooping panicles, about ·3-·35 m., tawny-pubescent, at the ends of the leafless branches. Bracts linear, caducous. Calyx 1·34 cm., diam.; membranous, campanulate, deeply 5-cleft, lobes spreading puberulous externally. Corolla none. Anthers 10, on the top of the staminal column. Ovary globose, puberulons on a gynophore as long as the calyx. Style curved. *Fr.*—consisting of 5 coriaceous, oblong, rusty densely tomentose follicles, about 4-7·8 cm., almost sessile. Seeds oblong, black, several in each carpel. *Fl. t.*—Mar.-Apr. *Fr. t.*—June-July. Leafless in cold season; new leaves in Mar. and Apr.

DISTR. :—Gujarat to S. Konkan; Sub-Himalayan tract from the Indus eastwards, common in forests throughout India: Burma, Andamans and Cocos Islands.

FIBRE :—The bark yields a coarse, strong, whitish-pink fibre which strips off the tree in long, broad flakes, which have a peculiar net like appearance. The fibre is used extensively in Madras, Burma and Bengal for making elephant-harness and drag-ropes and for tying rafts, and throughout India for making bags, ropes for all purposes. The rope made from this fibre is said to become stronger for a time, from being frequently wetted, but it seldom lasts more than 18 months if constantly exposed to moisture.

*See*—Fodder Plants.

## THESPESIA MACROPHYLLA Blume.

FAM.—Malvaceæ.

COM. NS. :—*M.* Ranbhendi.

CHAR. :—A small shrub. *L.*—fairly large, 3 lobed, cordate or truncate at the base. *Fl.*—large yellow with crimson centre. *Fr.*—ovoid, pointed, 4-5 volved.

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DISTR. :—Very common along the Western Ghats; Konkan. Kanara forests, Deccan: Tropical Africa, Java.

FIBRE :—The young twigs yield a good fibre used for binding loads of wood, etc.

*See*—Fodder Plants.

## THESPESIA POPULNEA Soland.

FAM.—Malvaceæ.

COM. NS. :—*E.* Tulip tree, Portia tree; *G.* Bendi, Paraschapipla; *H.* Parsipu, Parascha-jhad; *K.* Asha, Huvarsi; *M.* Bhend.

CHAR. :—A moderate-sized, evergreen tree; attaining a height of about 9-10·5 m. and girth of about ·9-1·2 m. *Bark* grey, smooth. All young parts covered with small rusty peltate scales. *L.*—7·8-13 × 7·8 cm., cordate, ovate, acute, acuminate or almost cuspidate, leathery, entire, glabrous, 5-7-nerved, with a glandular pore

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**Fibre Plants.**

beneath, between the nerves; petiole long, usually 6·5 cm. Stipules falcate. *Fl.*—large, pale, sulphur-coloured, turning reddish, on axillary, slender peduncles. Bracteoles (epicalyx) 5, oblong lanceolate, deciduous, as long as the bell-shaped, 5-toothed calyx. Corolla 5·2-7·8 cm. diam. Staminal tube 5-toothed at the apex. Ovary 5-celled. Style club-shaped, 5-furrowed. *Fr.*—capsule, 4 cm., coriaceous, globose, somewhat depressed, sprinkled with minue scales, ultimately glabrescent, 5-celled, indehiscent or opening slightly on the top. Seeds 2 in each cell, large, shortly tomentose or pilose. *Fl. t.*—throughout the year.

DISTR. :—Along the sea-shores of the Konkan and the N. Kanara; coast forests of India, Burma, Ceylon and Andamans; often cultivated as a road-side tree in towns near the sea-coast as at Calcutta, Madras, Bombay, Colombo.

FIBRE :—The bark yields a strong fibre, rarely employed in India except in rough state for tying bundles of wood. In Burma it is said to be used for cordage. It is said to be used in Demerara for making coffee bags. The fibre can be made use of for paper-making.

*See*—Medicinal Plants, Oils, Fodder Plants, Sacred Plants.

## TINOSPORA CORDIFOLIA Miers.

FAM.—Menispermaceæ.

COM. NS. :—*E.* Heart-leaved moonseed; *G.* Gado, Gulo, Gulvel; *H.* Gulancha, Gulhel, Gurch; *K.* Amritvalli, Uganiballi; *M.* Amarvel, Gulvel; *Sk.* Amrita-Valli, Jwaranashini, Pittaghni, Vatsadani.

CHAR. :—An extensive climber, bark corky, grooved; *L.*—membranous, 7-9 nerved, 5-10 cm., roundish cordate with a broad sinus; *Fl.*—in axillary and terminal racemes, yellow; male fascicled females solitary; *Fr.*—drupes, 1-3, dorsally convex, ventrally flat, red, size of a pea; *Fl. t.*—Apl.

DISTR. :—Throughout tropical India, Burma, Andamans and Ceylon.

FIBRE :—The aerial roots are used for tying bundles.

## TREMA ORIENTALIS Blume.

FAM.—Urticaceæ.

COM. NS. :—*E.* Nettle or Charcoal tree; *H.* Bandu-manu; *K.* Bendakarka, Gorklu; *M.* Kapashi, Kargol, Ranambada.

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CHAR. :–A fast-growing, short-lived evergreen tree, 7·5-9 m. high; girth ·45-·9 m. *Bark* smooth, grey, lenticellate. Branchlets more or less pubescent. *L.*–7·5-12 × 5-6·3 cm., ovate-oblong, acuminate, 3-nerved, cordate and unequal-sided at the base, serrate, more or less rough on the upper side, with white pubescence beneath. *Fl.*–greenish, sessile or sub-sessile, in axillary cymes, usually longer than the petiole. *Fr.*–drupe, very small, globose, black when ripe, 1-seeded. *Fl. t.*–more or less throughout the year. *Fr. t.*–rainy season.

DISTR. :–Throughout the Konkan and N. Kanara in moist forests common. More or less throughout India; from the foot of the Nepal Himalayas, Bengal, Bihar and southwards to Travancore, Ceylon, Malay Islands.

FIBRE :–The inner bark yields a long light-brown fibre which strips off the tree in thin, narrow bands which are easily separated after drying; used for tying the rafters of native houses, for binding loads, etc., it is also used for making ropes, twines and coarse cloth. In Assam it is used for making coarse cloth called *Amphak.* (Gamble).

## TRIUMFETTA RHOMBOIDEA Jacq.

FAM.–Tiliaceæ.

COM. NS. :–*M.* Nichardi.

CHAR. :–A small tough plant, hairy all over; stem rough. *L.*–variable, usually 3 lobed. *Fl.*–small, yellow in dense cymes. *Fr.*–nearly round, size of a pea covered with hooked prickles.

DISTR. :–Konkan, S. M. Country, Deccan, Kanara: Throughout the tropics generally; Malaya, China, Tropical Africa.

FIBRE :–The inner bark gives fibre which can be used for ropes and coarse cloth.

## TRIUMFETTA ROTUNDIFOLIA Lamk.

FAM.–Tiliaceæ.

COM. NS. :–*M.* Nichardi.

CHAR. :–A shrub. *L.*–small orbicular, hairy, irregularly toothed. *Fl.*–small yellow. *Fr.*–small ovoid, spiny, bristle prints hooked.

DISTR. :–Konkan, Deccan, Gujarat.

FIBRE :–The inner bark gives fibre.

### TYPHA ANGUSTATA Bory & Chaub.

FAM.—Typhaceæ.

COM. NS. :—*G*. Ghabajarin, *H*. Pater, *M*. Pankanis.

CHAR. :—A robust tall marshy herb. *L*.—exceeding the flowering stem, semicylindric above the sheath. Spikes cylindric ; the male and female spikes separated by a considerable interval. The species sometimes bears male and female flowers on different plants.

DISTR. :—Deccan ; more or less throughout India ; Sind, N. Asia, N. Africa.

FIBRE :—The fibrous stems and leaves are used for many purposes. They are used for making sieves in Kashmir, for thatching huts and house-boats ; for making soft mattings, ropes and baskets in Punjab. The fibre was tried for paper-making in Bally mills.

### UNONA PANNOSA Dalz.

FAM.—Anonaceæ.

COM. NS. :—No common names.

CHAR. :—A small tree, young parts puberulous. *L*.—5·9-10·4 × 2-4 cm., ovate-lanceolate, obtusely acuminate, rounded or acute at the base, glabrous above, pubescent beneath, thin, pellucid-dotted. *Fl*.—brown-tomentose, axillary, of a dirty-white colour, on very short peduncles, surrounded with one or more scaly bracts. Sepals ovate acute, 3 lines long, villous on the outside. Petals 4-5·2 cm. long, lanceolate, villous, inner narrower and shorter. Ovaries 8-12, densely strigose ; ovules 2-4. *Carpels* 5-6, oval-obtuse, subsessile, pubescent, seeds 1-3, large, shining. *Fl. t*.—Oct.

DISTR. :—Common in the Western ghats from Konkan southwards ; Kanara ; Malabar up to 1,050 m. Endemic in W. Ghats.

FIBRE :—The inner bark gives a strong fibre adapted for cordage and paper-making.

### URENA LOBATA Linn.

FAM.—Malvaceæ.

COM. NS. :—*M*. Van-bhendi.

CHAR. :—An herbaceous erect shrub. *L*.—broader than long, cordate, roundish, angled, serrate, lobes varying in size and number (3-10 or more). *Fl*.—small, pink. Fruit hairy, covered with blunt spines.

SECTION 1.

Fibre Plants.

DISTR. :—Widely distributed throughout the State. Konkan, Deccan, S. M. Country, All Tropical regions.

FIBRE :—The bark yields a good, easily extractible fibre which is considered suitable for manufacture of sacking and twine, and a fair substitute for flax and jute. In Madagascar, Cuba and Brazil, the fibre is used for preparing coffee bags.

## URENA SINNUATA Linn.

FAM.—Malvaceæ.

COM. NS. :—*H.* Kunjuya; *M.* Jangli or Ran-Kapas.

CHAR. :—A small shrub. *L.*—hairy, base cordate, irregularly lobed, lobes 3-5 or more, serrate. Pedicels axillary; clustered; *Fl.*—handsome, rose-coloured. *Fr.*—as in the preceding.

DISTR. :—Widely distributed, throughout the State. A common weed. Deccan, Gujarat, S. M. Country; all tropical regions.

FIBRE :—The bark yields a strong and tolerably fine fibre used in the same way as the preceding species.

The plant attains its full-size in wet-land and by the margins of tanks and rivers and that if necessary it might be cultivated in the same way as Jute. (Cameron).

## VENTILAGO CALYCULATA Tulas.

FAM.—Rhamnaceæ.

COM. NS. :—*H.* Raidhani, *M.* Kanvel, Karkandicha-vel.

CHAR. :—An extensive climber. *L.*—elliptic-oblong, serrate, base oblique, rounded or acute. *Fl.*—numerous in densely hairy paniculate spikes, greenish, with an offensive odour. *Fr.*—winged, girth about the middle by persistent calyx.

DISTR. :—Konkan; in deciduous forests, S. M. Country; throughout the hotter parts of India : Java.

FIBRE :—The bark yields a good cordage fibre.

*See*—Oils.

## VENTILAGO MADARASPATANA Gærtn.

FAM.—Rhamnaceæ.

COM. NS. :—*E.* Red Creeper; *G.* Ragatarshado; *H.* Pitti; K. Haruge, Kubbila Malamaitra, Poppli; *M.* Khandvel, Lokhandi, Sekalyel; *Sk.* Raktavalli.

CHAR. :—A large much branched woody climber; young branches and panicles pubescent; *L.*—5-10 × 2·5-3·8 cm., oblong-lanceolate or elliptic-ovate, entire or crenate; *Fl.*—in large drooping terminal panicles; buds 5-angled; *C.*—petals 5, greenish, with an offensive odour; *Fr.*—nut about 5 mm. diam., yellowish, globular, prolonged into a linear-oblong, 1-nerved wing; *Fl. t.*—Dec.-Jan. (T. Cooke) Rainy season (Talbot's Forest Flora).

DISTR. :—Madras State, Mysore, Ceylon, Tenasserim.

FIBRE :—The bark yields a fibre useful for cordage. Long climbing stems are also used instead of the ropes for tying purposes.

*See* Dyes and Tans.

## VETIVERIA ZIZANOIDES Stapf.

FAM.—Gramineæ.

COM. NS. :—*E.* Cuscus grass, Koosa; *G.* Valo; *H.* Bala, Bena Khas, Panni; *K.* Lavancha, Mudivala, Kuruvelu; *M.* Vala; *Sk.* Shit-Sugandhi-mulak, Ushira, Veernam.

CHAR. :—A densely tufted perennial grass; root-stock branching with spongy aromatic roots. Culms stout, up to over 1·8 m. high, usually sheathed all along. *L.—leaf* sheaths compressed, lower ones keeled and fan-like, blades narrowly linear 30-90 cm. long, erect, pale green, margin spinously rough. *Fl.*—panicle up to 30 cm. long; rachis stout, whorls 6-10 with up to 20 rays; racemes up to 5 cm., slender. Sessile spikelets, colour varying from yellowish to black.

DISTR. :—Practically over the whole of India eastwards to Burma; Lower Guinea in tropical Africa; throughout the Malayan regions, West-Indies and Brazil.

FIBRE :—The long fibrous roots are used throughout India for making '*Khus—tattis*' or aromatic scented mats which are hung on doorways and kept wet to cool the air in a house in hot weather; used also for manufacturing fans, baskets, etc. Stems are used to a limited extent for paper-making.

See—Oils.

## YUCCA GLORIOSA Linn.

FAM.—Liliaceæ.

COM. NS. :—*E.* Adam's Needle. *M.* Yacca.

CHAR. :—A magnificient alœ-like plant. *L.*—lanceolate, sharp-pointed; bearing during the rainy season, a large panicle of creamy-white flowers as large as hen's egg.

DISTR. :—A native of the West Indies, almost naturalised in Indian Gardens.

FIBRE :—The leaves contain a large quantity of fibre which is in many respects similar to that of Agave fibre. Fibre is good in length, rather wiry, fine, round, even, strong and easily dyed. The fibre has not attracted the attention it deserves.

## SECTION 2—OIL PLANTS.

### ABELMOSCHUS MOSCHATUS Medik.
### (HIBISCUS ABELMOSCHUS Linn.)

FAM.—Malvaceæ.

**SECTION 2.**
**Oil Plants.**

COM. NS. :—*E.* Musk-Mallow ; *G.* Mushakdana ; *H.* Mushakadana ; *K.* Kasturibende ; *M.* Kasturibhendi ; *Sk.* Lalakasturika.

CHAR. :—A tall annual shrub ; stem clothed with long hairs ; *L.*—polymorphous, cordate, the lower ovate, acute or roundish angled, upper palmately 3-7 lobed, lobes oblong-ovate, crenate, serrate or irregularly toothed, hairy ; *Fl.*—regular, bisexual, involucral bracts 8-12, hairy, yellow with purple centre ; *Fr.*—capsule fulvous hairy, oblong-lanceolate, acute ; *Sd.*—subreniform, blackish ; *Fl. t.*—cold season.

DISTR. :—Cultivated in the hotter parts of India ; tropics of the old-world.

OIL :—Seeds yield an oil of a musk-like odour, used in inferior perfumes.

*See*—Fibres.

### ACACIA FARNESIANA Willd.

FAM.—Leguminosæ, Minosaceæ.

COM. NS. :—*E.* Cassie Flower, Spongy Tree, Stinking Acacia ; *G.* Gandhelokhair, Jheri bavul ; *H.* Gandhbabul, Passibabal, Vilavati, Kikar ; *K.* Jali, Kari jali, Sanna jali ; *M.* Devababhul, Kankri ; *Sk.* Arimeda.

CHAR. :—A thorny shrub or a low tree, 6-7·5 m. high ; girth 3-6 m. *Bark* light brown, rough. *Branches* slender, zigzag, marked with grey or pale-brown dots. *Spines* stipular, straight. Common petiole 4-5 cm. *L.*—2-pinnate, 2·5-5 cm. long, pinnæ 4-8 pairs ; cup-shaped, glands below the lowest and often at the base of the uppermost pair ; leaflets 10-20 pairs. *Fl.*—bright-yellow, sweet-scented, in globose fasciculate heads. *Fr.*—pod, nearly cylindric, 5-9 cm., turgid, brown, slightly curved, pointed at the ends, dehiscent, glabrous, valves with raised parallel lines. Seeds embedded in dry spongy tissue. *Fl. t.*—Jan.-Mar. *Fr. t.*—in rainy season.

DISTR. :—Cosmopolitan in the tropics, but usually cultivated. Run wild near villages and in moist situations throughout the State ; Common in the eastern parts and in black-soil *nalas* of the Deccan. Sind.

OIL :—An inferior oil is obtained by the distillation or solvent extraction of flowers ; used in perfume. In Southern France the plant is largely grown for flowers.

*See*—Medicinal Plants, Gums and Resins, Dyes and Tans.

## ACORUS CALAMUS Linn.

FAM.—Araceæ.

SECTION 2.

Oil Plants.

COM. NS. :—*E*. Sweet flag ; *G*. Gandhilovaj, Godavaj, Vekhand ; *H*. Bach, Gorbach ; *K*. Baja ; M. Vekhand ; *Sk*. Bhutnashini, Jatila, Ugragandha, Vacha.

CHAR. :—An aromatic herb ; root-stock as thick as the middle finger, creeping and branching ; *L*.—0·9-1·8 ×1·7-3·8 cm., bright-green, acute, thickened in the middle, margins wavy ; spathe 15-75 cm. long ; spadix, 5-10 cm. long, obtuse, slightly curved, green ; sepals scarious, anthers yellow ; *Fr*.—turbinate, prismatic, top, pyramidal.

DISTR. :—Throughout India and Ceylon in marshes, wild or cultivated ascending the Himalayas up to 2,000 m., Sikkim. Throughout Asia, Europe and N. America.

OIL :—The dried rhizomes contain 1·5-3·5% of a yellow aromatic volatile oil. It has a mellow odour resembling that of patchouli. It is stated that considerable quantities of rhizomes of the plant are used in flavouring gin, beer, vinegar, etc.

## ACTINODAPHNE HOOKERI Meis.

FAM.—Lauraceæ.

COM. NS. :—*K*. Haggodimara, Tudgensu ; *M*. Pichli, Pisa.

CHAR. :—A medium-sized, evergreen tree. *Bark* light brown, smooth ; young shoots and petioles rusty-tomentose. *L*.—2·5-3 × 3-5 cm., in whorls of 5-8, more or less 3-nerved at the ends of branches, elliptic lanceolate, or ovate-lanceolate, acute or acuminate, narrow, rounded at the base, glabrous in age, dark-green and shinning above, glaucous beneath. *Fl*.—axillary, fascicled, few-flowered, covered with sub-orbicular golden scales. *Fr*.—somewhat like an acorn, oblong, resting on a concave cup. *Fl. t*.—Oct.-Nov. *Fr. t*.—Feb.-Mar. The verticles of white pubescent pendulous young leaves very conspicuous in some of the evergreen forests of North Kanara.

DISTR. :—Rain-forests along the ghats, Konkan, Matheran, Mahabaleshwar (very common), N. Kanara, Western Peninsula, Sikkim.

OIL :—Seeds contain 48% of solid fat. Seed-shell contains 25% of a reddish brown oil. Seed kernel is a much better source of lauric acid than palm (Elaeis guineensis Jacq.), kernel or Cocoa-nut oil.

*See*—**Medicinal Plants, Fodder Plants.**

**SECTION 2.**

**Oil Plants.**

## AEDENANTHERA PAVONINA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Red Wood ; *G.* Bari-gumchi ; *K.* Manjadi, Manjuti ; *M.* Val, Mothi Gunja, Thorli Gunja.

CHAR. :—A deciduous unarmed tree, 15-18 m. high ; girth 1·2-1·8 m. *Bark* grey. L.—abruptly bipinnate, 30-60 cm. long ; pinnæ 4-6 pair, opposite, short-penduncled, 10-20 cm. long ; leaflets 4-12 pairs, oblong, alternate, 1·5-3·75 cm. long on very short petiolules. *Fl.*—small, yellow, faintly fragrant, in short-peduncled racemes, 5-15 cm. long, simple from the axils of the leaves and panicled at the end of the branches. *Fr.*—pod, 15-23 × 1·3 cm., twisted, 10-12 seeded. Seeds scarlet red, shining, convex on both sides. *Fl. t.*—Mar.-May. *Fr. t.*—Aug.-Oct.

DISTR. :—Wild and planted. In the moist forests of Konkan and N. Kanara, nowhere abundant ; Gujarat, Khandesh, S. India, Bengal, Sikkim, Burma.

OIL :—Seeds yield 14% of fixed oil, containing 25% of Lignoceric acid. The oil may, therefore, be used in the preparation of this acid.

*See*—Dyes and Tans, Gums and Resins.

## ADHATODA VASICA Nees.

FAM.—Acanthaceæ.

COM. NS. :—*G.* Adsoge, Aduso, Ardusi ; *H.* Adalso, Arusho, Vasaka ; *K.* Adsala, Adumuttada, Adusoge ; *M.* Adulsa, Adusa, Vasuka ; *Sk.* Amalaka, Atursta, Sinhika, Vasaka.

CHAR. :—A dense shrub, 1·2-2·4 m. high, with opposite ascending branches ; *L.*—12-20 by 4-6 cm., elliptic lanceolate, dark green above, paler beneath ; *Fl.*—in axillary spikes towards the ends of the branches ; *C.*—tubular, white, with a few rose-coloured bars in the throat ; *Fr.*—capsule, clavate, bluntly pointed, orbicular, oblong, tubercular-verrucose ; *Fl. t.*—Aug.-Nov.

DISTR. :—Tropical India from the Punjab and Assam to Ceylon, Malaya, S. E. Asia.

OIL :—Leaves contain very small amounts of an essential oil, which has got medicinal properties.

*See*—Dyes and Tans, Fodder Plants.

## ÆGLE MARMELOS Corr.

FAM.—Rutaceæ.

COM. NS. :—*E.* Bael tree, Bengal Quince ; *H.* Bel, Bili ; *K.* Bela, Baelpatri, Bilapatri ; *M.* Bel.

SECTION 2.
Oil Plants.

CHAR. :—A small or moderate-sized tree, armed with axillary, straight, strong thorns 2·6 cm. long, 9-12 m. high and girth about ·9-1·2 m. *Bark* 1·34 m. thick, light cinerous grey, soft, corky, exfoliating in irregular flakes. *L.*—3-foliolate, alternate. Leaflets 3 (very rarely 5), oblong or broadly ovate-lanceolate, acute or obtusely acuminate, crenulate, membranous, inconspicuously pellucid-punctate, the lateral ones smaller and almost sessile, the terminal one much larger, 5·2-5·9 × 3·6 cm., long-petioluled. *Fl.*—3·2 cm. diam., greenish-white, sweet-scented, on long slender, pubescent pedicels, forming axillary puberulous racemes. Calyx pubescent, deciduous. Petals oblong, coriaceous, thickly dotted, imbricate. Stamens numerous (30-40). Filaments distinct, subulate, inserted round a small disc. Anthers linear-oblong. Ovary ovoid, 8-20 celled; cells near the circumference. Style short; stigma capitate or oblong, deciduous. *Fr.*—woody, globose, oblong or sometimes pyriform, 5·2-13 cm. diam., smooth, grey or yellow. Seeds numerous, oblong, woolly, imbedded in a thick, sweet, aromatic, orange-coloured pulp. *Fl. t.*—about May. *Fr. t.*—rainy season. Sheds leaves—Mar.-Apr.; new foliage at the end of hot season. A specimen with 7 and 9 leaflets has been observed in one of the houses in the City of Poona. (Godbole).

DISTR. :—Wild in Gujarat and the Deccan, Konkan; throughout India in dry places, wild or cultivated; often cultivated near temples; Sub-Himalayan tract from the Jhelum eastwards: Burma.

OIL :—From the flowers a scented water is distilled in Southern India. Leavs yield on distillation a small quantity of essential oil.

*See*—Medicinal Plants, Gums and Resins, Dyes and Tans, Sacred Plants, Fodder Plants.

### AGERATUM CONYZOIDES Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Goat-weed; *K.* Nayitulsi; *M.* Osadi, Sahadevi.

CHAR. :—An annual herb; rough, hairy and strong-smelling. *L.*—ovate, crenate, ciliate on margins. *Fl.*—small, pale purple or white in dense terminal heads; bracts linear. *Fr.*—Achenes black.

DISTR. :—Naturalised in the Bombay State, where it is common in the Deccan. S. M. Country; throughout India: Ceylon (abundant), all hot countries.

OIL :—Leaves and flowers yield 0·02 % of essential oil possessing a powerful nauseating odour.

### ALBIZZIA LEBBEK Benth.

FAM.—Mimoseæ.

COM. NS. :—*E.* Parrot or Siris or Sizzling tree; *G.* Kalsadasado, Kalo or Piloshirish; *H.* Gars, Kalshish, Sirai, Tantia; *K.* Dodde or Hombage, Sirisa; *M.* Chinchola, Kalashirish, Shirish; *Tr.* Kokko.

CHAR. :—A tall unarmed deciduous tree, 9-12 m. high; girth 1·83 m. *Bark* brownish-grey, rough with numerous short irregular cracks. *L.*—Common petiole 7·5-30 cm., glabrous or downy, with a large gland near the base. Pinnæ 4-8 with or without one or more glands between the lowest; leaflets 8-18, unequal-sided, rigid, glabrous or pubescent, obtuse, 2·5-4 cm. *Fl.*—white, fragrant, glabrous or downy, larger than in the last species. Heads many-flowered, on peduncles 3-4 together, arising from the uppermost axils. *Fr.*—legume, 20-30 × 2-4 cm., firm, yellow-brown, thin, 6-12-seeded. *Fl. t.*—Apr.-June. *Fr. t.*—Aug.-Sept. New leaves Mar.-Apr.

DISTR. :—Dry and moist monsoon forests; throughout the State; commonly planted along roadside. Throughout India, usually planted; sub-Himalayan region from the Indus eastwards, Bengal, Burma, Ceylon, Tropical Asia and Africa.

OIL :—An oil is extracted from the seeds and is considered useful in leprosy.

*See*—Medicinal Plants, Dyes and Tans, Fodder Plants.

## ALEURITES MOLUCCANA Willd.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Belgaum Walnut, Candle Nut tree.

CHAR. :—A handsome, ornamental evergreen tree, 12-18 m. high, girth 1·5-1·8 m. Young shoots covered with a brownish stellate tomentum. *L.*—10-20 × 7·5-15 cm., collected at the ends of branches, ovate-lanceolate, acute or acuminate, often 3-5-lobed and covered with a brownish or whitish tomentum when young and glabrous when old, cordate or obtuse at the base with 2 glands at the insertion of the petiole. *Fl.*—numerous, rather small, white, on large terminal panicles; male flowers usually at the ends of the branches of the panicles; female flowers sessile in the divisions of the panicles. Calyx both of male and female flowers pubescent or tomentose. Styles 2, 2-cleft. *Fr.*—drupe, 2·5-5 cm. diam., fleshy a little compressed, olive-coloured, containing 2-or by abortion a single hard 1-seeded nut. *Fl. t.*—Apr.-May. *Fr. t.*—rainy season.; fruits ripen next cold season.

DISTR. :—Planted in gardens, throughout the State: indigeneous in the Malay Archipelago.

OIL :—The nuts contain 50% of oil. It is produced by extraction. It is very fluid, of an amber colour, odourless, insoluble in alcohol, readily saponifiable and dries quickly. It is used as food and for burning. It is known as *Kekuma* in South India. Torches are made by stringing nuts in thin bamboos strips; they burn like candles giving clear, steady light. The oil is useful in the paint and varnish industry.

*See*—Dyes and Tans, Gums and Resins.

## ALLIUM SATIVUM Linn.

FAM.—Liliaceæ.

SECTION 2.
Oil Plants.

COM. NS. :—*E.* Churl's or Poor-man's treacle, Garlic; *G.* Lasan; *H.* Lahsan, Lasan; *K.* Bellulli; *M.* Lasun; *Sk.* Lashuna, Rasonaka, Ugragandha.

DISTR. :—Widely cultivated. It is an important garden crop.

OIL :—The bulbs on distillation yield clear, colourless, limpid oil rarely used for medicinal purposes. It is chiefly used for spicing foods.

*See*—Condiments and Spices.

## ALPINIA GALANGA Swartz.

FAM.—Scitaminaceæ.

COM. NS. :—*M.* Kulinjan.

CHAR. :—A herb. Rootstock perennial, tuberous, slightly aromotic. *L.*—large, oblong-lanceolate, green with slightly white margins. *Fl.*—greenish-white in dense-flowered panicles; the lip obovate, clawed, white veined with red. *Fr.*—size of a small cherry, orange-red.

DISTR. :—Konkan, N. Kanara; Throughout India, often cultivated; Ceylon, Malay Islands.

OIL :—Green rhizomes contain essential oil. Leaves also yield a volatile oil. Rhizomes are used medicinally.

*See*—Dyes and Tans.

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## AMOORA ROHITUKA W. & A.

FAM.—Meliaceæ.

COM. NS. :—*H.* Harin harra or khana; *K.* Mulla-muttala; *M.* Rohitak.

CHAR. :—A large evergreen tree, trunk straight, 15-18 m. high; girth 1·2 m. *Bark* thin, grey, rough. Young parts tawny, closely tomentose. *L.*—·3-·9 m., coriaceous, glabrous. Leaflets 9-15, 7·8-23·4 × 3·5-10·4 cm., opposite, oblong or ovate-lanceolate, acuminate at the apex, somewhat unequal at the base, entire, shortly-petioluled. *Fl.*—white or greenish-white, bracteate, sub-sessile, about 4 lin. diam.; male spikes panicled; female simple. Calyx 5-partite. Petals 3, oval. Staminal tube entire, globular. Ovary 3-celled. *Fr.*—capsule, smooth, globose, pale-yellow or reddish, 2·6-4 cm. diam. Seeds oblong, enclosed in a fleshy arillus. *Fl. t.*—rainy season. *Fr. t.*—cold season up to Mar. *Fl.*—and ripe fruit hot season. May (*Talbot*).

DISTR. :—Fairly common in the evergreen forests of N. Kanara; W. Peninsula from N. Kanara southwards to Anamalais. Sub-Himalayan tract from the Tapi river eastwards, Sikkim, Assam, Chota-Nagpur; Burma, Andamans and Cocos Islands. This handsome tree is sometimes planted for ornament.

OIL :—Seeds give an oil on extraction, used for lighting and for other economic purposes in Bengal.

## ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cashew Apple or Nut; *G.* Kaju; *H.* Kaju; *K.* Gerubi, Godambe, Kampu; *M.* Kaju.

CHAR. :—A small evergreen tree with a short thick trunk, 7·5-9 m. high, girth ·6-·9 m. *Bark* thick, rough, grey-coloured. *L.*—coriaceous, 10-15 × 3·8-7·5 cm., obovate or elliptic, rounded at the apex, shining above. *Fl.*—in terminal panicles with cymose branching yellow with pink stripes. Corolla petals linear lanceolate, deflexed. *Fr.*—nut, reniform, 2·5 cm. long, dark-coloured on a pyriform yellow, orange or red-coloured fleshy peduncle. *Fl. t.*—Jan.-Mar. *Fr. t.*—Mar.—Apr.

DISTR. :—Introduced from S. America. Naturalised throughout the State; very common near the seashore in open situations in Konkan and N. Kanara, especially in sandy places and often gregarious; along the coast forests of India and Ceylon; also cultivated.

OIL :—From the plant two distinct oils are obtained—

(1) Kernels under high pressure yield a light-yellow, bland oil, which is very nutritious. The finest quality in every respect is equal to almond oil and considered superior to olive oil. But owing to the high price of the kernels it is not advantageous to make use of this as edible oil.

(2) Cardole or cashew-apple oil. This is prepared from the pericarp or shell of the nut. It is black, acrid and powerfully vesicating. In India the oil is employed as a water-proof agent and as a preservative in the painting of boats, fishing-nets, etc. It is an effective preventive against white-ants in carved woodwork, books, etc.

It is only in recent years that the oil has attained technical importance. The destilled shell-oil and the polimerization products of the distillate have found their way into the composition of diverse products—insulating varnishes, type-writer rollers, oil and acid-proof cold-setting cements, flooring tiles, automobile brake linings, etc. The use of the shell-oil as a mosquito larvicide has been suggested.

*See*—Medicinal Plants, Fruit Trees, Dyes and Tas, Gums and Resins.

SECTION 2.

Oil Plants.

## ANDROPOGON IWARANCUSA Jones.

FAM.—Gramineæ.

COM. NS. :—No names.

CHAR. :—A perennial tall grass; rootstock creeping, roots aromatic. whole plant of a pale glaucous green. *L.*—flat, linear with capillary tips. Panicle very variable, branches distant or crowded, simple or branched.

DISTR. :—Gujarat; Sind.

OIL :—The grass yields an oil named *cusa* oil.

## ANDROPOGON ODORATUS Dna.

FAM.—Gramineæ.

COM. NS. :—*M.* Gandhel, Gavat-vedi.

CHAR. :—An aromatic fairly tall grass; stem erect as thick as a swan's quill at the base, leafy, nodes bearded. *L.*—linear-lanceolate, rough, bright green. Racemes, numerous, purplish, silky, forming a dense panicle.

DISTR. :—Konkan, Deccan—Mawal, Khandesh; Western Peninshula. Apparently endemic.

OIL :—The grass may give on distillation an aromatic oil.

## ANISOMELES MALABARICA R. Br.

FAM.—Labiatæ.

COM. NS. :—*M.* Gojibha.

CHAR. :—An erect shrub, thickly woolly; stems quadrangular, clothed with wooly hairs. *L.*—very thick, oblong-lanceolate, pale above, white below, serrate. *Fl.*—in dense whorls purple, tubular.

DISTR. :—Deccan, Katraj-ghat; Kanara; Western Peninsula; Penang, Mauritius.

OIL :—The plant on distillation gives an oil which is considered as an effective application in rheumatism.

*See*—Medicinal Plants.

## APIUM GRAVEOLENS Linn.

FAM.—Umbelliferæ.

COM. NS. :—*E.* Celery.

CHAR. :—It is a biennial herb forming a fleshy root and a clump of compound leaves with long leafstaks, which are large and succulent.

DISTR. :—Cultivated occasionally in gardens all over.

OIL :—The fruits yield 2-3% of pale yellow volatile oil, with a persistant odour, characteristic of the plant. It is much valued as a fixative and as an ingredient of novel perfumes. Fruits also yield 17% of fatty oil used medicinally. Green leaves also give volatile oil. It is of no commercial importance.

*See*—Medicinal Plants.

## ARACHIS HYPOGEA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Monkey-nut, Ground-nut; *G.* Chinimug; *H.* Mungphali; *K.* Bhuimug, Nelkadle; *M.* Bhuimug.

CHAR. :—A procumbent branching herb; stems hairy. *L.*—equally pinnate, leafless ovate. *Fl.*—yellow. Pod tough leathery, grey or brown, reticulated. Seeds reddish brown.

DISTR. :—Cultivated extensively in the Bombay State except Konkan. A native of Tropical America.

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OILS :—Groundnuts are mainly cultivated for oil. The seeds on expression yield a clear, straw, coloured, non-drying, edible oil. Various types of machinery are used for extracting oil from seeds. The most important are the bullock-driven *ghani*, and the power-driven rotary mill and expellers. The *ghani* is employed in villages for pressing out oil. More than one-third of the total weight of oil produced in India is from *ghanis*. The yield varies from 35 to 39% by weight of kernels. Since the seeds are cold pressed, the oil is free from mucilage and albuminous matters and there is no loss of vitamins. It is said to be of superior quality and is preferred for edible purposes. The power-driven rotary mill is an adaptation of the *ghani*. The yield of oil varies from 36 to 42%. Expellers are used in most of the large factories. The meal is heated prior to pressing by passing it through a steam-jacket. The yield of oil varies from 40 to 44%.

Cold pressed oil is golden yellow in colour and has a faint agreeable odour and a bland taste. The hot-pressed oil has a strong reddish yellow tinge.

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It is predominently an edible fat. In India *ghani*-prepared oil is largely used for culinary purposes. The large quantities are used for adulterating other edible oils such as gingely, rape, etc. Large quantities of oil now used in India for the manufacture of vegetable ghee by hydrogenation. In western countries the oil is used for the manufacture of margarine. It is a very good salad oil. For pharmaceutical purposes the oil from the seeds is obtained by cold extraction. Its properties are similar to those of olive oil. The oil can be sterilised by heating and it may then be used in the preparation of medicines for injection. It is used in the form of emulsion for feeding children. The oil (usually lower grades) blended with other oils and fats is used in soap-making; to a limited extent in the preparation of cosmetics, leather dressings, tallow substitutes, etc. It has been employed as a substitute for diesel oil in internal combustion engines. It is used as a lubricant and is also used for burning. A 50% blend with Kerosine oil gives satisfactory results in ordinary kerosene lamps. It is used as a substitute for olive oil for oiling scoured wool fibres, for making ointments, liniments, plasters, etc.

This crop forms one of the main oil-seeds exported from the country. Most of the crop grown in the Bombay State consits of early foreign varieties, the chief of which are 'Big Japan', 'Pondicherry', 'Small Japan', and 'Spanish Peanut'. The crop is becoming more and more popular due to increasing demand and the good price it fetches.

*See*—Medicinal Plants.

## ARGEMONE MEXICANA Linn.

सत्यमेव जयते

FAM.—Papaveranceæ.

COM. NS. :—*E.* Mexican prickly poppy; *G.* Darudi; *H.* Bharbhand, Bila dhatura, Shialkanta; *K.* Balurakkisa, Datturi, Pirangi datturi; *M.* Daruri, Firangi-Kate-Pivala dhotara; *Sk.* Brahma dandi, Pitapushpa, Srigalkanta, Svarnakshiri.

CHAR. :—A glabrous, glaucous herb; stem 0·3-0·12 m. high prickly, branching; juice yellow; *L.*—thistlelike, stem clasping, oblong, 7·5-18 cm. sinuately pinnatifid, spinous, veins white; *Fl.*—terminal, yelow, 2·5-5 cm. diam.; *Fr.*—capsule, prickly, oblong-ovoid 2·5-3·8 cm. opening by 4-6 valves; *Sd.*—numerous globose, netted, brownish black; *Fl. t.*—all the year.

DISTR. —:Introduced and naturilised throughout India. Indigenous in tropical America.

OIL :—The seeds yield a pale-yellow, clear, limpid oil used medicinally, for burning and as a lubricant. Mixed with linseed oil, it may be used in the paint industry.

Recently this is used for adulterating mustard oil in Uttar Pradesh and has proved injurious to the persons who made use of this oil in cooking. Many cases of dropsy were reported from U. P., owing to the use of this adulterated mustard oil.

### ARTEMISIA NILAGIRICA Pamp.

### (ARTEMISIA VULGARIS Linn.)

FAM.—Compositæ.

COM. NS. :—*E.* Flea-bane, Indian wormwood, Mother or Mugwort; *H.* Dona, Majtari, Mastaru, Nagduna; *K.* Dovana, Manjipatri; *M.* Dhor-davana, Gathona; *Sk.* Nagdamani, Nilpushpa, Saraparni, Sugandha.

CHAR. :—A perennial shrub, aromatic, 0·6-2·4 m. high, hairy, stem leafy; *L.*—lower leaves 5-10 × 2·5-5 cm. petioled, ovate, deeply pinnatisect; base lobed, lobes entire, toothed or again pinnatisect, pubescent above, white tomentose beneath; upper leaves smaller, 3-fid or entire, lanceolate; *Fl.*—heads ovoid or subglobose, solitary or 2, 3 together in horizontal or suberect panicled racemes, outerflowers female, inner hermaphrodite, fertile, involucral bracts villous; *Fr.*—achene, minute, bolong ellipsoid; *Fl. t.*—Jan.

DISTR. :—Throughout hilly districts of India, Ceylon, temperate Asia; Thailand (Siam), Java.

OIL :—The plant yields 0·2% of volatile oil. This oil has been found to be a good larvicide like kerosene, although it is only a feeble insecticide.

### ARTOCARPUS HIRSUTA Lam.

FAM.—Moraceæ.

COM. NS. :—*E.* Anjeli-wood tree; *K.* Hebalsu, Hebhalasu, Hebbalsina, Hesswa, Hessain; *M.* Pat-or Ran-Phanas; *Tr.* Aini.

CHAR. :—A very lofty evergreen tree attaining height of 60 m. (Brandis), with a trunk of great girth. *Bark* dark-coloured, scaly, young shoots, pedicels and peduncles hirsute with long tawny hairs. *L.*—broadly elliptic or ovate, coriaceous, entire; *Fl.*—on the axillary pedunculate receptacels; *male* receptacle narrowly cylindric, 10-15 cm. long, at first erect, afterwards pendulous; *female* ones erect, 11·3 × 8 cm. *Fr.*—size of a lemon, echinate; spines cylindric, straight hispid. Seeds ovoid. *Fl. t.*—Jan.-Feb. *Fr. t.*—ripe in May.

DISTR. :—In the evergreen forests of the Konkan and N. Kanara. Deccan-Bhor country. Western Peninsula on the ghats from the Konkan southwards ascending to 1200 m.

OIL :—Seeds contain 17-18% of oil, used locally in medicine and is also eaten.

## ATLANTIA RACEMOSA W. & A.

FAM.—Rutaceæ.

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COM. NS. :—*E.* Wild lime; *K.* Adwi Nimbe; *M.* Makad or Ran Limbu.

CHAR. :—A shrub or a small tree; spines strong and sharp, sometimes absent. *L.*—1-foliate; leaflets 5-10 ×2·5-4 cm., elliptic rounded at the apex, emarginate, entire or crenulate, glabrous, reticulately veined, base acute. *Fl.*—in axillary recemose cymes; pedicels short; bracts minute, subulate. Calyx usually 4-sometimes 3-5-lobed; lobes rounded or subacute, ciliolate. Petals white, broadly elliptic or obovate, very concave in bud, not adnate to the staminal tube, glandular. Stamens 8; filaments usually united into a tube throughout nearly their entire length, sometimes united at the base only when they are linear and flattened. Anthers large, cordate, attached at the back near the base on the triangular teeth of the staminal tube or the triangular apex of the filaments. Disk cupular. Ovary ovoid, oblong or obovoid. Style short, stout, somewhat clavate. *Fr.*—berry, globular, 2 cm. in diam. *Fl. t.*—Dec. *Fr.* t.—Apr. (ripe).

DISTR. :—Tolerably abundant at Mahabaleshwar and Matheran, Khandala, Raigad, Parghat, Ambolighat; common in some of the N. Kanara forests; gregarious in the evergreen forests near Ainshi ghat; Western India from Konkan to Ceylon.

OIL :—Fruits yield an oil used medicinally for external application

## AZADIRACHTA INDICA Juss.

FAM.—Meliaceæ.

COM. NS. :—*E.* Neem or Margosa tree; *G.* Limbada, Limbra; *H.* Nim, Nimla; *K.* Bevu, Nimba; *M.* Bilant-Nib, Kadulimb.

CHAR. :—A moderate-sized to large tree, 12-15 m. sometimes 24 m. high, girth 1·8-2·7 m. *Bark* grey, with numerous scattered tubercles. *L.*—imparipinnate, approximated near the ends of the branches, 20·8-39 cm. long. Leaflets 9-15, 2·6-7·8 × 1·34-4 cm., opposite, subopposite or alternate, ovate-lanceolate, unequal sided, oblique or subfalcate, acuminate, serrate, glabrous, very shortly petioluled. *Fl.*—small, white, honey-scented, on short puberulous pedicels arranged in large, solitary, axillary panicles shorter than the leaves. Calyx lobes 5, minute, rounded. Petals 5, shortly ciliate. Staminal tube as long as the petals. Anthers 10 opposite the teeth of staminal tube. Ovary 3-celled. *Fr.*—drupe, oblong, size on an olive, yellowish-green, stone almost always 1-celled, 1-seeded. *Fl. t.*—March-May. *Fr. t.*—rainy season. Sheds leaves—hot season; new leaves—Mar.-Apr.

DISTR. :—A common tree growing throughout the greater part of India in the dry region; usually planted along roadside; also self-sown. In dry forests of the Karnatak and parts of the Deccan; Dry land forests of Burma.

OIL :—A fixed acrid bitter oil, deep yellow, and of a strong disagreeable flavour, is extracted from the seeds by boiling or by pressure. The oil is mostly used medicinally; recently it is employed in the preparation of Margosa or Neem soap; also used by poorer classes for burning.

*See*—Gums & Resins.

## BALANITES ROXBURGHII Planch.

FAM.—Simarubaceæ.

COM. NS. :—*H.* Hingu, Hingan, Hingol, Hingota, Inqua; *K.* Ingiluka, Ingaludagida; *M.* Hingan, Hinganbet.

CHAR. :—A shrub or a small tree. *Bark* yellow or cinerous (Talbot), grey (Gamble), thick; in favourable circumstances grows to a height of 9 m. with an erect trunk, ·6 or more m. in girth. All young parts greyish pubescent, armed with very strong, sharp, ascending solitary sprines, frequently bearing leaves and flowers. *L.*—bifoliolate, in short petiole. Leaflets 2·6-4 cm., elliptic or obovate, entire, puberulous, shortly petioluled, coriaceous. *Fl.*—greenish-white, fragrant, in axillary 4-10 flowered cymes. Sepals and petals 5, ovate, tomentose disc. Ovary entire. *Fr.*—drupe, woody, ovoid, about 5·2 cm. long, 5-grooved, with a smooth, light-grey rind. Nut hard, 1-seeded, imbedded in an offensive smelling, greasy-pulp. *Fl. t.*—Apr.-May. *Fr. t.*—Dec. Leafless in cold season; new leaves in Mar.

DISTR. :—Throughout the driest parts of the State and open situations. Common in Gujarat, (Panch-Mahals, Kaira), Cutch, Bihar, Madhya Pradesh, Sikkim and other dry parts of India, Burma. It is characteristic of black-cotton soil (Gamble).

OIL :—The kernal of seeds yields 43 % of a bland, yellow, tasteless oil; used medicinally.

*See*—Fodder Plants.

## BAUHINIA VARIEGATA Linn.

FAM.—Cæsalpinaceæ.

COM. NS. :—*G.* Kovidar; *H.* Kachnar, Kaniar, Pedrian; *K.* Arisiganlinga, Kangivala, Utipe; *M.* Kanchan.

CHAR. :—A medium-sized deciduous tree, young shoots brown and pubescent. *Bark* grey with vertical cracks. L.—10-15 cm. long and as broad, cleft 1/4 to 1/3 into two obtuse lobes, base deeply cordate. *Fl.*—in racemes, large, fragrant, white or purplish. Corolla petals 5, 6·3 cm. long, clavate with broad claws all white or 4 purple and fifth darker. *Fr.*—Pod, 15-20 × 1·8-2·5 cm., flat, dehiscent. Seeds 10-15. *Fl. t.*—Feb.-Apr. *Fr. t.*—Nov.

DISTR. :—Cultivated throughout the State, often as a road-side tree; not indigenous; sub-Himalayan tract and outer Himalayas of the Punjab from the Indus eastwards, Kumaon, Sikkim. Burma, China.

OIL :—Seeds are said to yield an oil.

*See*—Medicinal Plants, Dyes & Tans, Gums & Resins. Fodder Plants.

## BENINCASA CERIFERA Sav.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Ash Pumpkin, *G.* Koholu, *H.* Kondha, *K.* Budekumbhalkai, *M.* Kohola.

CHAR. :—A large climber, softly hairy; tendrils 2-fid. *L.*—cordate, reniform, more or less 5-lobed. *Fl.*—large, yellow, solitary, male and female. *Fr.*—large, fleshy, cylindrical, covered with waxy bloom.

DISTR. :—Cultivated occassionally in the gardens during the rainy season; said to be native of Japan and Java.

OIL :—Seeds yield a mild, bland, pale coloured oil. The fruit of the plant excretes upon its surface a waxy substance resembling bloom. This is said to be produced in sufficient quantity to be collected and made into candles.

*See*—Vegetables.

## BLUMEA ERIANTHA DC.

FAM.—Compositæ.

COM. NS. :—*M.* Nimurdi.

CHAR. :—Herbaceous plant; stem erect, slender, more or less hairy. *L.*—irregularly toothed, lower leaves stalked, upper sessile, hairy or silky villous. *Fl.*—heads on long, slender peduncles, Involucral-bracts linear clothed with long silky hairs.

DISTR. :—Konkan, Deccan, Lonavala, Khandala. S. M. Country, Belgaum; Western Peninsula.

OIL :—The herb yields an essential oil possessing camphor-like smell, consisting chiefly of d-carvotanacetone, Erianthin; the yellow colouring matter obtained from it has been shown to be a flavone.

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**Oil Plants.**

## BLUMEA LACERA D. C.

FAM.—Compositæ.

COM. NS. :—*M.* Burando.

CHAR. :—An annual herb, with a strong odour of turpentine. Stem erect ·3-1 m. high, ash coloured, densely glandular-hairy. *L.*—lower petioled, incised, upper obovate, or elliptic oblong, serrate, finely silky on both hte surfaces. *Fl.*—clustered, yellow.

DISTR. :—Konkan, Deccan, Kanara, S. M. Country; growing over all dry rice fields; throughout the plains of India: Ceylon, China, Malaya, Tropical Africa.

OIL :—Fresh herb in flower when distilled with water, yields 0·085% of light-yellow essential oil containing Blumca camphor.

*See*—Medicinal Plants.

## BLUMEA MALCOLMII Hook f.

FAM.—Compositæ.

COM. NS. :—No names.

CHAR. :—A rather stout plant, densely silky-woolly. Stem leafy, ascending, sometimes decumbent. *L.*—sessile, thick, obovate, irregularly toothed, densely silky-wooly. *Fl.*—heads in leafy panicles; yellow. Involucral bracts linear, silky hairy.

DISTR. :—Konkan hills, Deccan. Matheran, Khandala, Mahabaleshwar, S. M. Country. Apparently endemic in the Bombay State.

OIL :—The plant yields an essential oil with the following constants d-carvotanacetone (82%) tetrahydro-carvone (16%).

## BRASSICA CAMPESTRIS Hook

FAM.—Crucifereæ.

COM. NS. :—*E.* Rape Seed, *G.* Sarsav, *H.* Sarson, *M.* Shiras.

CHAR. :—A tall annual; *L.*—large, glaucous beneath, *Fl.*—yellow, *Fr.*—2-valved and 2-celled. Seeds numerous, yellow or brown.

DISTR. :—Cultivated mostly in North Gujarat in the Bombay State.

OIL :—Seeds by extraction yield about 35% of oil. It is used as food and for burning in lamps. The oil is supposed to burn for quite a long time and is also used for smearing bodies. In Europe the oil is used as a lubricant for machinery.

*See*—Medicinal Plants.

## BRASSICA JUNCEA (L.) Coss.

FAM.—Crucifereæ.

COM. NS. :—*E.* Mustard, *G.* Rai, *H.* Rai, *K.* Sasive, *M.* Mohri.

CHAR. :—An annual. Stems tinged with purple. *L.*—Pinnatifid or sinuate-lyrate. *Fl.*—yellow. Pods long. Seeds many, brown.

DISTR. :—Cultivated all over the State; Ahmedabad and Nasik are the important districts growing mustard.

OIL :—Seeds by extraction yield 25-35 % of oil. The oil is found in minute quantities and ranges from 1/2 to 3/8 % of the weight of the seed. It is used as an edible-oil and as a lamp-oil. It is considerably used for medicinal purposes.

*See*—Condiments and Spices.

## BRASSICA NIGRA Koch.

FAM.—Cruciferea.

COM. NS. :—*E.* Black Mustard, *G.* Rai, *H.* Rai, *K.* Sasivi, *M.* Mohrai.

CHAR. :—A hispid annual. *L.*—stalked, lower lyrate, upper entire. *Fl.*—yellow, racemes moderately long. Pods erect, pressed closely to the axis.

DISTR. :—Cultivated in fields all over during the cold season, around wheat or gram fields or mixed with wheat or linseed.

OIL :—Seeds contain a fixed non-drying oil which is obtained by expression. On distillation black-mustard yields a volatile oil (the essential oil of mustard). It is to this essential oil that the pungent smell and taste of mustard is due. It is extensively used in cooking; used as a substitute for lard or ghee. It is used to anoint the body before bathing; it prevents excessive perspiration and prickly heat and also protects the skin from the direct rays of the sun. It is also used medicinally.

*See*—Medicinal Plants, Condiments and Spices.

## BUCHANIA LANZAN Spreng.
## BUCHANANIA LATIFOLIA Roxb.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Charoli; *H.* Char, Paira, Piyal; *K.* Charpoppu, Kolegeru, Murukali; *M.* Char, Charoli, Pyalchar.

CHAR. :—A moderate-sized, deciduous tree; trunk straight, 12-14 m. high, girth 1·2 m. *Bark* 2·5 cm. thick, dark-grey, sometimes nearly black, rough, tessellated with regular "boss" like prominence. *L.*—15-25 × 6·3-12·5 cm., rounded or obtuse at the tip, coriaceous, firm, entire, 15-20 pairs of prominent nerves, villous or pubescent, glabrate beneath, on a flattened, stout, pubescent petiole. *Fl.*—numerous, greenish-white, small, sessile or on very short-pedicels, forming terminal and axillary, woolly or velvety, much-branched panicles. Calyx small, 5-toothed. Corolla petals oblong. Disc fleshy, 10-lobed. Stamens 10. Ovary only 1-fertile conical, hairy, the remaining 4-reduced, to staminodes. *Fr.*—drupe, compressed, smooth, sub-globose, black when ripe, 1·3 cm. long. Nut hard, bony, 2-valved. *Fl. t.*—Jan.-Mar. *Fr. t.*—Apr.-May. Sheds leaves in hot season.

DISTR. :—In dry and open forests throughout India, Konkan, Deccan, Dangs; Gujarat, S. M. Country, Burma, Cambodia, Indo-China, Siam.

OIL :—The kernels of fruits called *Chironji* yield an oil. It is pale, straw-coloured, limpid, sweet and wholesome; reported to be used as a substitute for olive or almond oil.

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins, Fodder Plants.

## BUTEA MONOSPERMA O. Kuntz.

## (BUTEA FRONDOSA Roxb.)

FAM.—Papilionaceæ.

COM. NS. :—*E.* Bastard Teak, Bengal Kino Tree, Flame of the Forest; *G.* Khakda, Khakaro; *H.* Chinchra, Dhak, Kakria; *K.* Muttala, Kuttugga; *M.* Palas, Paras.

CHAR. :—A moderate-sized, deciduous tree; 12-15 m. high, girth 1·8-3 m. *Bark* fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissure a red juice, which hardens into gum. Young parts covered with grey or brown silky pubescence. *L.*—pinnately-trifoliolate, in petiole 7·5-15 cm. long. Leaflets 10-15 × 7·5-11·7 cm., coriaceous, hard, glabrescent above, hoary beneath; two lateral ones oblique-ovate; the terminal one roundish, obtuse, often emarginate at the apex, rhomboid at the base, larger, as long as broad in the middle. *Fl.*—large, bright orange-red, on thickly brown pubescent pedicels, arranged in tomentose, terminal and axillary racemes 15 cm. long. Calyx 1·3 cm., silky inside. Corolla petals equal, densely clothed on external side with silky pubescence; standard broad; keel-acute, incurved. *Fr.*—legume, pendulous, tomentose, 6-8 × 4-5·5. Seed oval, flat, brown. *Fl. t.*—Feb.-Mar. *Fr. t.*—June-July. Sheds leaves in cold season; new leaves in Apr.

DISTR. :—Throughout the State, common in deciduous forests of Konkan. Deccan, Khandesh; throughout India from the Himalayas to Ceylon and Burma, usually in open grassy savannahs where it is often gregarious.

OIL :—The seeds of this tree yield a small quantity of bright-yellowish, tasteless oil called sometimes *muduga* oil; this is sometimes used medicinally.

*See*—Medicinal Plants, Fibres, Dyes and Tans, Gums and Resins, Fodder Plants, Sacred Plants.

## CAESALPINIA BONDUCELIA Flemi.

FAM.—Cæsalpinaceæ.

COM. NS. :—*E.* Ever nut, Physic nut; *G.* Gajga; *H.* Katkaranj, Katkaleja; *K.* Gajjige, Tapasi; *M.* Gajaga, Sagargota; *Sk.* Kakechika, Karanja, Kuberakshi.

CHAR. :—An extensive climber, branches armed with hooked and straight, hard, yellow prickles; *L.*—abruptly pinnate, 30-60 cm. long, petioles prickly; pinnæ 6-8 pairs, 5-7·5 cm. long with a pair of hooked spines at the base; leaflets 6-9 pairs, elliptic-oblong, strongly mucronate; *Fl.*—in terminal and supra-axillary racemes. *C.*—yellow; *Fr.*—pod, shortly stalked, oblong, 5-7·5 × 4·5 cm., densely armed on the faces with prickles; *Sd.*—1·2 oblong, lead-coloured 1·3 cm. long; *Fl. t.*—July-Sept.

DISTR. :—Throughout India, Sind, the tropics, generally.

OIL :—The seeds contain a fixed oil. It is expressed from the seeds; it is used as cosmetic and is said to soften the skin and pimples; also used medicinally.

## CÆSALPINIA SAPPAN Linn.

FAM.—Cæsalpinaceæ.

COM. NS. :—*E.* Sappan-wood tree; *G.* Bakam; *H.* Bakam, Patanga; *M.* Patang.

CHAR. :—A small tree, 6-9 m. high; stem prickly, 15-23 cm. in diameter, branches rufous hairy, armed with a few small prickles. *L.*—20-37 cm. long, pinnæ 8-12 pairs, 10-15 cm. long, subsessile, with small prickles at the base. Leaflets 10-18 pairs, subsessile, oblong, rounded at the apex, attached at the lowest corner, very inequilateral (upper side much the largest), glabrous above, hairy beneath. *Fl.*—in panicles which are terminal and in the axils of upper leaves, 30-40 cm. long. Calyx leathery. Corolla 2 cm., across. Petals orbicular, yellow, subequal, upper with a red spot at the base. Stamens waxy white; filaments densely wooly at the base. *Fr.*—pod, 7·5-10 × 4-5 cm., woody, obliquely oblong, polished, indehiscent, with a hard recurrved short beak at the upper angle of the obtuse apex. Seeds 3-4. *Fl. t.*—Sept.-Oct.

DISTR. :—Often planted in gardens in Bombay and the Deccan, South India, Bengal, Burma.

OIL :—The leaves contain a very small quantity of pleasant smelling essential oil.

*See*—Dyes and Tans.

### CÆSALPINIA SEPIARIA Roxb.

FAM.—Cæsalpinaceæ.

COM. NS. :—*E.* Mysore thorn, *M.* Chillar.

CHAR. :—A climbing shrub. Stem stout, woody, armed with strong hooked prickles. *L.*—large, pinnate, rachis prickly. *Fl.*—bright yellow in simple terminal and axillary racemes. *Pods* linear-oblong, with a long beak, turgid, narrowly winged depressed between the seeds.

DISTR. :—Common, Konkan, Deccan, S. M. Country; often used as a fence; throughout India; Ceylon, Malaya, China, Japan.

OIL :—The young pods contain an essential oil.

*See*—Dyes and Tans.

### CALOPHYLLUM INOPHYLLUM Linn.

FAM.—Guttiferaceæ.

COM. NS. :—*E.* Alexandrian Laurel; *G.* Udi; *H.* Sultan-champi; *K.* Wuma, Hona, Pinekai; *M.* Undi; *Tr.* Poon.

CHAR. :—A beautiful evergreen tree; stem short with a thick cylindrical trunk; 15-18 m. high with a girth of about 1·8-4·2 m. *Bark* dark coloured, scaly, fissured. *L.*—10·4-20·8 × 7·8-8·13 cm., elliptic or obovate-oblong, obtuse or retuse at the apex, usually acute at the base, firmly coriaceous, glabrous, shining; on a rather strong petiole. *Fl.*—about 2·6 cm. in diam., pure white, fragrant, arranged in axillary, glabrous, lax, few-flowered racemes, the length of the leaves or somewhat shorter. Calyx-sepals 4, the two inner petaloid. Corolla-petals 4, rarely 6-8. Stamens numerous, in 4 bundles. Ovary round, stipitate; style much longer than the stamens; stigma peltate. *Fr.*—an indehiscent drupe, 2·6 cm. diam., globular, yellow when ripe, pulpy. *Fl. t.*—cold season. *F. t.*—hot season.

DISTR. :—Very common in Malbar and the sandy shores of the S. Konkan and N. Kanara, associated with littoral species. Indigenous, throughout the W. Peninsula, Orissa, Burma, Ceylon and the Andamans, particularly near the sea-coast, also cultivated as an ornamental tree.

OIL :—The kernels yield a rich. large quantity of dark green fatty oil amounting even to 60 % by weight. The oil varies in colour from greenish-yellow to dark-green. It possesses a disagreeable flavour and an odour which is described as fragrant by some and disagreeable by others. It is used for burning and is of excellent quality for soap-making. When mixed with resin of *Vateria indica* (*Dhupa*), it is used for caulking boats on the West coast. It is chiefly valued as a medicine. It deposits a quantity of solid fat after having been kept a short time.

*See*—Medicinal Plants, Gums and Resins.

## CALOPHYLLUM TOMENTOSUM Wight.

FAM.—Guttiferaceæ.

COM. NS. :—*E.* Poon Spar tree, Sirpoon tree ; *K.* Surhonne, Ponne, Kve ; *M.* Nagari ; *Tr.* Poon.

CHAR. :—A large, tall evergreen tree. Trees 45 m. high with a girth of 4·5 m. are common. *Bark* yellowish with long, wavy, vertical fissures, branches 4-gonous, young shoots and panicles rusty-tomentose. *L.*—7·8-13 ×3·2-5·2 cm., elliptic or linear-lanceolate, with a bluntish acumination rigidly coriaceous, shining glabrous. *Fl.*—white, about 1·34 cm. diam., on slender pedicles, or racemes from the axils of upper leaves, sometimes arranged into a large terminal many-flowered panicle. Calyx-sepals 4, subrotund. Corolla-petals 4, ovate. Ovary 1-celled, 1-ovuled; stigma peltate. *Fr.*—drupe, ovoid, pointed, about 2·5 cm. long. *Fl. t.*—Jan.-Feb. *Fr. t.*—end of rainy season.

DISTR. :—Evergreen forests of the Western Peninsula from the Konkan southwards, ascending to 1,500 m. ; Ceylon.

OIL :—The kernels yield 70 % of oil with unpleasant odour. It is used for burning in lamps in Ceylon.

*See*—Gums and Resins.

## CALOPHYLLUM WIGHTIANUM Wall.

FAM.—Guttiferaceæ.

COM. NS. :—*E.* Poon Spar of Travancore ; *K.* Irai, Kirihonne, Kulponne ; *M.* Bobbi ; *Tr.* Poon.

CHAR. :—A middle-sized, evergreen tree, branches terete, young shoots square, glabrous. *Bark* very thick and characteristic, yellow. *L.*—5·2-10·4 × 3·2-5·2 cm., cuneate-obovate or oblong-cuneate, obtuse or retuse at the apex, very rigidly coriaceous, shining, on petiole 1/6 in. *Fl.*—white, 67 cm. diam., on slender pedicels, with

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a caducous bract at their insertion, arranged in axillary, many-flowered racemes, shorter than the leaves. Calyx-sepals 4, thin, strongly veined. Corolla-petals usually none. Ovary 1-celled. *Fr.*—2 cm., oblong. *Fl. t.*—Dec. *Fr. t.*—Mar.

DISTR. :—Moist forests of the Western Peninsula from the Konkan southwards. Common along the banks of North Kanara rivers; Ceylon.

This tree is everywhere becoming scarce and calls for strict conservation (Birdwood and Beddome).

OIL :—Sun-dried seed kernels yield 45-50 % of greenish-yellow oil having a bitter taste; used as a lamp-oil and also medicinally.

*See*—Gums and Resins.

## CANNABIS SATIVA Linn.

FAM.—Urticaceæ.

COM. NS. :—*E.* Hemp; *G.* Bhang, Ganja; *H.* Ganja; *K.* Bhangi; *M.* Bhang; *Sk.* Ganja, Harshini, Mohini, Shivapriya, Siddhapatri, Vijaya, Unmattini.

CHAR. :—A tall erect dioecious annual herb strongly smelling, usually 0·9-1·5 m. high in its feral state, female plant supposed to grow taller than the male; *L.*—alternate or the lower opposite, upper 1-3, lower 3-8 foliate, serrate; *Fl.*—small axillary dioecious, male fascicled; female crowded under conyolute bracts; male flowers, sepals 5, imbricate, female perianth hyaline; *Fr.*—achene.

DISTR. :—Throughout India wild in the Himalayas, Central Asia; cultivated in tropical and temperate regions.

OIL :—The seeds when expressed yield a pale, limpid oil. It is at first greenish or brownish-yellow but the colour deepens when exposed to air. It has disagreeable flavour and a mild odour. In Western countries, it is used as paint and varnish oil, and also for manufacturing soft soaps.

*See*—Fibres.

## CAPPARIS GRANDIS Linn.

FAM.—Capparidaceæ.

COM. NS. :—*K.* Torate; *M.* Kauntal, Katarni, Pachoonda.

CHAR. :—A small tree, generally unarmed, sometimes armed with slightly curved thorns; trunk thick, thorns short; about 4·5 m. high. Branchlets and leaves softly yellowish, tomentose. *Bark* thick, extremely irregular, rough and corky, deeply and irregularly cracked. *L.*—5·2-7·8 ×1·3-5 cm., ovate or obovate, acute at both ends, or rarely obtuse, glabrous on both surfaces when old. *Fl.*—2-2·6 diam., white, in terminal corymbs or racemes; pedicels slender. Calyx sepals tawny, puberulous, unequal. Corolla petals narrow-obovate, unequal. Stamens numerous. Gynophore slender. *Fr.*—size of nutmeg, globose, purple, 2-6 seeded. *Fl. t.*—May. Sheds its leaves in the hot season.

DISTR. :—Hilly parts of the Karnatak, Deccan and Ceylon; Dharwar districts; Chanda district; Eastern ghats; dry regions of Ceylon; Prome district in Burma. Fairly common in the dry open forests on the Katraj ghat and Chatursingi hills near Poona.

OIL :—The seeds yield an oil mainly used as illuminant.

### CARALLIA BRACHIATA Merr.

### (CARALLIA INTEGERRIMA DC.)

FAM.—Rhizophoraceæ.

COM. NS. :—*K.* Andamargal, Andipunnar, Makad-bhirand; *M.* Pansi, Punshi, Shengali.

CHAR. :—A moderate-sized, glabrous evergreen tree, 7·5-15 m. high, girth 1·2-3 m. *Bark* dark-grey, thin. *L.*—dark-green, lucid, quite entire, or rarely serrulate towards the apex, elliptic-ovate, obovate, narrow, oblong, obtuse, acute or short acuminate, narrow or acute at the base, glaborous, coriaceous. *Fl.*—white, very small, usually 8-merous, in dense, almost capitate, short-peduncled, axillary cymes. Calyx broad-campanulate. Corolla petals deeply laciniate, obovate concave, not embracing the stamens. *Fr.*—berry, size of a pea, globose, 1-seeded. *Fl. t.*—Feb.-Mar. *Fr. t.*—Apr.-June.

DISTR. :—Throughout the evergreen forests of the Konkan and N. Kanara, Matheran, Khandala, S. M. Country. Forests of the outer Sikkim, Himalayas, Bengal, Assam, Burma, Ceylon, Malaya, China, Australia.

OIL :—The oil extracted from the seeds is used as a substitute for ghee in Kanara.

### CARTHAMUS TINCTORIUS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Safflower, *G.* Kusumbo, *H.* Kusumba, *K.* Kusumba, *M.* Kardai.

CHAR. :—An annual thistle like herb. *L.*—alternate, rigid, spinescent. *Fl.*—hermaphrodite, yellow; involucre sub-globose bracts many seriate; receptacle flat, densely bristly. *Fr.*—obovoid, angular; pericarp white. This variety is particularly grown for oil purposes.

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DISTR. :—Cultivated in the State. The cultivation is mostly confined to the south-east portions of the Deccan and the Karnatak—occupying about 416, 298 acres.

OIL :—The oil is obtained from the seeds either by cold dry pressure in a country-ghani or by hot dry distillation. Often the oil-seed is decorticated by rough grinding between stones and the husk separated by sifting before being pressed for oil. Hydraulic presses, expellers and solvent extraction methods are used for commercial production of oil in other countries.

The oil is an important industrial product. The oil content of the seeds ranges from 20 % to 30 %. One maund of seeds yields roughly 16 lbs. of oil and 28 lbs. of oil-cake.

The oil obtained by cold expression is a clear, straw-yellow coloured liquid, and is extensively used in cooking. It is also used for burning in lamps and for manufacture of soaps. This is one of the sweet oils of the bazar. It is often adulterated with ground-nut and sesame oils. It is supposed to be the 'macassar' oil of the European perfumers and large quantities of seed are exported to the U. K every year. The oil lends itself satisfactorily to heat treatment, refining and bleaching. It possesses good drying properties and can be used in paints, varnishes and other products. These products are superior to similar products made with linseed-oil, in regard to non-yellowing property of the coating. Paints, varnishes and enamels made from safflower and linseed oils are equally durable and weather resistant. Hot oil poured into cold water, solidifies into a getatinous mass used as a glass cement and as a fixing agent for ornamental stones and tiles in place of plaster of Paris. The oil turns into a plastic mass on long boiling on a slow-fire. In this condition it is used as a water-proofing material for cloth, etc.

The oil obtained by the hot dry distillation method is black and sticky and unsuitable for cooking purposes. It is used for greasing well-ropes and leather goods exposed to water. The yield of oil is about 25 % higher than that by the cold method.

The cake obtained from decorticated seeds is used as a cattle feed while that from un-decorticated seeds is used as manure.

*See*—Medicinal Plants, Dyes and Tans, Vegetables.

## CARUM COPTICUM Benth.

FAM.—Umbellifereæ.

COM. NS. :—*E.* Bishop's weed ; *G.* Ajamo ; *H.* Ajwain ; *K.* Oma ; *M.* Owa.

CHAR. :—An annual herb. *L.*—sparse, decompound, ultimate segments all linear. Involueres from 4-8, linear. *Fl.*—white. *Fr.*—ovoid, muricate, ridges distinct.

DISTR. :—Cultivated as a minor crop, chiefly confined to the district of East Khandesh in this State.

OIL :—The seeds on distillation yield about 4% to 5% of volatile oil used medicinally. The chief constituent of the oil is thymol. The seeds of 'Owa' have, therefore, been used in England and Germany for the manufacture of thymol, large quantities of which are now produced and used as anticeptics.

*See*—Medicinal Plants, Condiments and Spices.

## CEIBA PENTADRA (Linn.) Gærtn.

## (ERIODENDRON ANFRACTUOSUM DC.)

FAM.—Bombacaceæ.

COM. NS. :—*E.* The white silk cotton tree, Kapok tree ; *H.* Hatian, Katan, Safed-Simal, Senibal ; *K.* Dudi mara, Billi-lurga, Marali ; *M.* Katesawar, Shamielula.

CHAR. :—A moderate-sized tree, growing to large size in Khandesh, 18-24 m. high, girth 3-3·6 m. Trunk straight, armed when young with conical woody prickles ; branches spreading horizontally ; all parts glabrous. *L.*—5-8 foliolate, on petioles as long as or longer than the leaflets ; leaflets 7·8-10·4 × 2·6 cm. lanceolate, acuminate or cuspidate with a mucro, entire or serrulate towards the point, glaucescent beneath, shortly petioluled or almost sessile. *Fl.*—appearing before the leaves, of a digny white colour, on peduncles about 5·2 cm., fascicled, axillary or terminal 1-flowered, drooping. Calyx thick, coriaceous, 5-lobed, lobes roundish, glabrous externally downy within. Petals 5, 2·6 cm., oblong, connate at the base, thick, tomentose outside. Staminal bundles, 5, united at the base, each bearing 2-3 variously convolute, linear, 1-celled anthers. Ovary ovoid, 5-celled, thick ; stigma entire or 5-lobed. *Fr.*—capsule oblong, thick, coriaceous, 5-valved. Seeds numerous, black, imbedded in a silky wool. *Fl. t.*—Feb.-Mar. *Fr. t.*—Apr.-May. Sheds leaves in cold season ; continues leafless till hot season.

DISTR. :—Wild in Khandesh ; also in Gujarat, Poona, Konkan and N. Kanara ; throughout hotter parts of India. Planted near villages and temples. Burma.

OIL :—The seeds are said to yield a bright red or dark-brown clear oil. As the seeds are often eaten it may be inferred that the oil is edible. Refined oil has the same use as refined cotton seed oil. It is one of the adulterants of pea-nut oil in China.

*See*—Fibres.

## CELASTRUS PANICULATA Willd.

FAM.—Celastraceæ.

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COM. NS. :—E. Black-oil tree, Climbing-staff plant; Intellect tree; G. Malhangana, Velo; *H.* Malkakni, Malkamni; *K.* Kangli, Kangodi; *M.* Kangani, Malkangoni; *Sk.* Jyotismati, Kanguni, Sphutabandhani, Svarnalata.

CHAR. :—Large deciduous climber, 18 m. high, stem up to 23 cm. in diam.; branches rough, unarmed, reddish brown, covered with lenticels; *L.*—alternate, ovate or obovate, 6·3-10 × 3·8-7·5 cm., crenate, shining above; *Fl.*—in drooping panicles, small yellowish-green usually unisexual; *Fr.*—capsule, bright yellow, globose; *Sd.*—1-6 completely covered with red, fleshy arillus.

DISTR. :—Sub-Himalayan tract from the Jhelum eastward up to 2000 m., throughout the hilly parts of Madhya Bharat, Madras State, Ceylon, Burma, Malaya Peninsula, and Archipelago.

OIL :—The seeds yield by expression a deep scarlet or yellow oil used medicinally. The oil deposits a quantity of fat after it has been kept for a short time. It has acrid and pungent odour. It is also burnt in lamps.

An orange-red, semi solid fat is obtained on extraction of the fleshy arils.

Dr. Herclots gave the name '**Oleum nigrum**' to this oil. The local people call it "*Kanguni tel*".

*See*—Fodder Plants.

सत्यमेव जयते

## CELOSIA CRISTATA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*E.* Cock's comb; *G.* More-shikha; *H.* Murgha-khaphal; *M.* Mayurshikha.

CHAR. :—A showy annual herb; stem erect, branches grooved. *L.*—variable, linear or linear-lanceolate. *Fl.*—in red or yellow monstrous and curiously branched heads.

DISTR. :—Grown in gardens as an ornamental plant all over.

OIL :—A fatty oil called *Celosia* oil is obtained from the seeds.

## CERATONIA SILIQUA Linn.

FAM.—Leguminosæ.

COM. NS. :—*E.* The carob tree, The Locust-bean; *H.* Maccani-amli.

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CHAR. :—A medium-sized deciduous tree. Pods are large, dark-red, woody, containing pale brown shining seeds embedded in a sweet pulp.

DISTR. :—Occasionally planted in gardens in the State. A native of South Europe, Syria and Palestine.

OIL :—Seeds yield a fatty oil.

## CERBERA ODOLLAM Gærtn.

FAM.—Apocynaceæ.

COM. NS. :—*K.* Chanda, Hande, Tande; *M.* Sukanu.

CHAR. :—A lrage evergreen shrub or a small tree, with acrid milky juice; attains 12-13 m. in height and 0·9-1·2 m. in girth. Branchlets whorled, marked with leaf-scars. *Bark* white. *L.*—10-15 cm. to 30 cm., oblong-lanceolate or obovate-lanceolate, acuninate, tapering into a slender 2·5-4 cm. petiole, entire and shining *Fl.*—white, sometimes with a yellowish throat, sweet-scented, in a corymhose terminal pedunculate cyme. Calyx-lobes reflexed, about 1·3 cm., deciduous along with the bract; bracts coloured, large very deciduous. Corolla-tube 2 cm. long, sometimes longer nearly as long or longer than the lobes. *Fr.*—drupe, ovoid, brown or blackish when ripe, size of an apple. *Fl.* t.—June-Jan. (Cooke). At different times throughout the year (Talbot).

DISTR. :—Salt swamps of the South Konkan and N. Kanara; planted in hedges near the sea-coast at Murdeshwar. Throughout India in salt-swamps and on the sea-coast, abundant on the Malabar coast. Malaya Archipelago, China, Australia, Pacific Islands.

OIL :—Seeds yield an oil which is used for burning. Burmese use this as an hair-oil.

*See*—Medicinal Plants, Fibres, Poisonous Plants, Fish Poisons.

## CHLOROXYLON SWIETENIA DC.

FAM.—Meliaceæ.

COM. NS. :—*E.* Satin Wood; *K.* Huragalu, Mashwal; *M.* Bheria. Billu, Halda.

CHAR. :—A moderate-sized deciduous tree. *Bark* soft, spongy, fissured, light grey or yellow. Young parts, petioles and inflorescence covered with minute grey pubescence. *L.*—abruptly pinnate, 13-23 cm. long. Leaflets 20-40, 1·7-4 × 0·7-1·3 cm., opposite, sub-opposite or alternate, unequal-sided, obliquely oblong, obtuse at the apex, glabrous on both sides, pale and dotted on the under surface, shortly petiolulate. *Fl.*—white, small, on long villous pedicels, forming large, branched, terminal and axillary panicles. Calyx lobes 5, ovate, acute. Petals 5, free from the base, membranous. Stamens 10; filaments free, inserted in the sinuses of the disc. Ovary 3-celled. *Fr.*—capsule, 2·6 × 1·3 cm., oblong, dark-brown, glabrous. *Fl. t.*—Mar.-Apr. *Fr. t.*—Apr.-Oct. Nee leaves appear in May.

DISTR. :—Common on the Satpuras and the drier parts of the Bombay State; abundant on the sandstone formation both in the Bijapur and Belgaum districts. Madhya Bharat, and Southern India, Ceylon.

OIL :—The wood of the tree yields an essential oil.

*See*—Gums & Resins.

## CINNAMOMUM ZEYLANICUM Blume

FAM.—Lauraceæ.

COM. NS. :—*E.* Wild Cinnamon tree; *G.* Dalchini, Taj; *H.* Dalchini, Darchini, Kash; *K.* Dalchini, Lavange-hakke, Nisane; *M.* Dalchini.

CHAR. :—A middle-sized evergreen tree; branchlets compressed, grooved. 9-12 m. high, girth 1·2-1·5 m. *Bark* brown, 1·3-2 cm., thick, rough in very old trees; inner bark reddish. *L.*—opposite or sub-opposite, 7·5-12·5 × 4-7·5 cm., rigid, more or less coriaceous, elliptic-lanceolate, obtusely pointed at the apex, more or less acuminate and sometimes unequal at the base, glabrous and shining above, glaucous beneath, 3-5 nerved. *Fl.*—tomentose, small, usually hermaphrodite, on long terminal, corymbose panicles equalling the leaves, the ultimate ramifications 3-flowered. *Fl. t.*—Nov.-Mar. *Fr. t.*—June-Aug. Every part of the plant when bruised gives a powerful odour of cinnamon.

DISTR. :—Rain forests, along the ghats from the Konkan southwards. Very common in the N. Kanara district. Western Peninsula, Burma, Ceylon, Malaya Peninsula, indigenous and cultivated. Cultivated in the Malaya Islands and elsewhere in the tropics.

OIL :—The bark of the plant yields the essential oil of Cinnamon an oil of considerable importance. Three oils are obtained from this plant :—

(1) The stembark yields an oil by distillation. It is of a golden-yellow colour with the powerful odour of cinnamon, sweet and aromatic, but with a burning flavour. It is largely used in perfumary and for flavouring confectionary.

(2) Leaves yield a brown, viscid, pungent essential oil of clove-like odour; used for flavouring sweets and confectionary and is also used medicinally.

(3) Root-bark yields an oil differing from both stem-bark and leaf. It is a colourless liquid, with camphoraceous odour. Camphor separates out on allowing the oil to stand.

*See*—Medicinal Plants, Condiments & Spices.

## CITRULLUS COLOCYNTHIS Sch.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Bitter apple, Colocynth ; *G.* Indruk, Indrayana ; *H.* Ghorumba, Indrayan, Makal ; *K.* Pavamekke Kayi, Tumtikayi ; *M.* Indraphal, Indrayan, Kaduvrindavan ; *Sk.* Chitraphala, Katurasa, Mahendravaruni, Trapusi.

CHAR. :—An extensively climbing annual ; stem thick, angular ; young shoots woolly, tendrils bifid ; *L.*—7·5-20 cm. long, deeply divided or but moderately lobed, somewhat hairy ; *Fl.*—large, monœcious, solitary ; *C.*—subcampanulate, 5-partite, yellow within, greenish outside, lobes obovate-oblong, 5-nerved. *Fr.*—up to 25 cm. diam., subglobose, smooth, greenish, waxy coated ; flesh juicy, red or yellowish white ; *Sd.*—usually margined ; *Fl.* t.—Nov.-Jany.

DISTR. :—Throughout India wild or sparingly cultivated Ceylon. Also indigenous in Arabia, W. Asia, N. and tropical Africa and in the Mediterranean region.

OIL :—Seeds yield a clear, limpid oil used in many of the Southern States for burning in lamps. It is said to be used to dye the hair.

## CITRULLUS VULGARIS Sch.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Watermelon ; *G.* Tarbuj ; *H.* Tarbuja ; *K.* Kallangade ; *M.* Kalingada.

CHAR. :—An herbaceous climber, stems thick, angular ; young shoots hairy. *L.*—fairly large, usually deeply divided. *Fl.*—male and female, rather large yellowish outside and and greenish inside. *Fr.*—greenish, large flesh watery, red.

DISTR. :—Cultivated throughout the State on the river-banks ; said to be indigenous in Tropical and South Africa.

OIL :—The seeds yield a clear, bland, pale green or yellow coloured limpid oil used for burning in lamps. It has pleasant odour and taste and is used for cooking.

*See*—Fruits.

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## CITRUS ACIDA Linn.

FAM.—Rutaceæ.

COM. NS. :—*E.* Sour lime ; *G.* Limbu ; *K.* Limbe hannu ; *M.* Kagdi limboo.

DISTR. :—Cultivated almost throughout the State.

OIL :—An essential oil is extracted from the skin of the fruits, used to perfume hair-oils, etc.

## CITRUS AURANTIUM Linn.

FAM.—Rutaceæ.

COM. NS. :—*E.* Sweet-orange ; *G.* Narangi ; *H.* Narenj ; *K.* Narange M. Santra.

DISTR. :—Cultivated in gardens.

OIL :—Flowers, leaves and fruit-skin, all yield valuable oils much valued in the perfumary trade.

A fragrant oil called "Oil of Neroli" by perfumers is yielded by flowers on distillation with water. Extraction of this oil is chiefly carried out in South France. Fine *neroli* oil is brownish, of most fragrant odour, and has bitterish aromatic flavour. This oil is exclusively used in perfumary.

Orange-flower-water—This is an important article of manufacture among the distillers of essential oils. There are three sorts of orange-flower waters found in commerce. (1) distilled from flowers, (2) made with distilled water and *neroli*, (3) distilled from leaves, stems and young unripe fruits. Orange-water is colourless or of a faintly greenish-yellow tinge, almost transparent with a delicious odour and bitter taste.

*See*—Medicinal Plants, Fruit Trees.

## CLITORIA TERNATEA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Garani, Koyala ; *H.* Aparajita, Kalina, Kowa, Wowatheti ; *K.* Girikarniballi ; *M.* Gokarni, Kajli ; *Sk.* Aparajita, Girikarnika, Gokarnika, Vishnukranta.

CHAR. :—A perennial twining herb, stems terete, pubescent ; *L.*—imparipinnate, leaflets 5-7, elliptic oblong, 2-2·5 × 2-3·2 cm. ; *Fl.*—axillary, solitary ; *C.*—much exerted, 3·8-5 cm. long ; standard bright-blue or white, with an orange centre ; *Fr.*—pol 5-10 × 8-13 cm., flat, nearly straight, beaked, hairy ; *Sd.*—6-10, yellowish-brown, smooth ; *Fl. t.*—June-Jan.

DISTR. :—Cosmopolitan in the tropics.

OIL :—Seeds contain a fixed oil,

## COCHLOSPERMUM RELIGIOSUM (L.) Alst.

FAM.—Cochlospermaceæ.

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COM. NS. :—*H.* Kumbi, Gabdi, Galgal; *K.* Kad-buroga; *M.* Ganglay, Galgal, Ganeri.

CHAR. :—A small deciduous tree, with short, thick spreading branches, 6-9 m. high, with a girth 0·6-0·9 m. *Bark* 2·6 cm. thick, fibrous, deeply furrowed; inner substance red. Branchlets, young leaves, and peduncles grey-tomentose. *L.*—7·8-20·8 cm. diam., palmately 3-5-lobed, old glabrous, lobes acute or acuminate, entire; petioles long, thick; stipules linear, caducous. *Fl.*—10·4-13 cm. diam., bright yellow, on terminal panicles. Sepals oblong, concave, silky. Petals obcordate, obliquely emarginate or irregularly cleft. *Fr.*—capsule, 5·2-7·8 cm., 5-lobed, size of a goose-egg. Seeds numerous, covered with long cottony hairs. *Fl. t.*—Feb.-Apr. *Fr. t.*—June-July. Sheds its leaves in Jan.; new leaves appearing in May.

DISTR. :—Deccan, Gujarat, common in the Khandesh Satpudas on the trap; also in the Belgaum district on Kaladgi quartzite; forests at the base of the Western Himalayas, from the Satlej eastwards, Madhya Bharat. Burma. Cultivated in Ceylon near temples.

OIL :—The seeds give an oil which is little used.

*See-* Fibres, Gums and Resins, Fodder Plants.

## COCOS NUCIFERA Linn.

FAM.—Palmaceæ.

COM. NS. :—*E.* Coconut Palm, Porcupine-wood; *G.* Narial, Naliyar; *H.* Narial; *K.* Tare, Tengin-mara, Tengu; *M.* Mad, Naral; *Tr.* Porcupine-wood.

CHAR. :—A tall tree, 12-24 m. high; trunk grey or greyish-brown, more or less straight, marked with annular leaf-scars; base surrounded by a mass of rootlets. *L.*—1·8-4·5 m. long, leaflets equidistant 60-90 cm., linear-lanceolate, coriaceous. Spadix 1·2-1·8 m., stout, simply panicled, lower spathes splitting length-wise *Fl.*—unisexual. *Fr.*—drupaceous nut, 20-30 cm., 3-gonously sub-globose, green or yellowish; cavity large filled with sweet, somewhat milky fluid. *Fl. t.*—throughout the year. *Fr. t.*—fruit ripens 9-10 months after flowering.

DISTR. :—Cultivated throughout the State extensively near the sea. Common in Konkan and N. Kanara; Cultivated inland also. Lower basins of the Ganges and the Brahmaputra. S. India, Malabar, Coromandel coasts; islands of the Indian Ocean, coasts of America and Africa (Tropics).

OIL :—The copra from the nut yields the coconut oil of commerce. The oil content of the copra is about 50%. Copra which has partially deteriorated through fungus attack gives very high yield of oil. Similarly copra from the kernel still remaining in 7-months old seedlings contains oil as high as 77%. The yield depends upon the moisture content of the copra and on the milling equipment.

In India and Ceylon oil is extracted from the copra by bullock-driven ghani, rotary ghani, expeller and hydraulic press. In Cochin and Malabar it is a common practice to add gum-arabic previously soaked in water, at the rate of 2-4 lbs. for 6 cwt. to facilitate crushing. Expellers are used by millers in Bombay and Ceylon. Hydraulic presses are only used in largest concerns in India, Ceylon, Java, Philippines, Europe and U. S. A. Solvent extraction plants are used in the Philipines.

Coconut oil, prepared in the tropical countries is a colourless to pale-brownish-yellow in colour, while that, prepared in temperate countries is greasy, white to yellowish solid fat. It gives the lowest turbidity among the common vegetable oils in various modifications of the Valenta test. It has the highest saponification and lowest iodine value among the vegetable oils.

It is extensively used for edible and industrial purposes. For edible purposes it is refined. The best known refined oil in India is cocogem. Coconut butter prepared from the oil is used in confectionery. The main use of the oil is in the soap industry. Coconut oil soaps lather easily. The oil is used as an adjunct for milk fat and as an ingredient of artificial milk for infants. It is used as an hair oil and as an ingredient of cosmetics, shampoos, lotions, pomades, etc. Products derived from the oil and oil fatty acids find numerous applications in the food, textile, leather, paper and synthetic resin industries. It is used in pharmacy as an ointment base. Hydrogenated oil and fatty acids are used medicinally. It is also used as a lamp oil. By cracking coconut oil under pressure at high temperature, motor fuel and diesel oil are obtained.

The oil is often adulterated with groundnut oil and mineral oils.

Coconut oil cake is a valuable feeding stuff for cattle. It tends to increase milk.

## CORIANDRUM SATIVUM Linn.

FAM.—Umbelliferæ.

COM. NS. :—*E.* Coriander ; *G.* Konphir ; *H.* Dhania ; *K.* Kothambri ; *M.* Kothimbir.

DISTR. :—Extensively cultivated all over the State.

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Oil :–The seeds yield from 0·7-1·1% of a volatile oil on distillation in water. It is colourless or yellowish and has the odour and flavour of coriander. It is chiefly used as a flavouring agent for liquors and in cocoa and chocolate industries.

The fruits also contain 19-21% of a fatty oil. It is dark brownish green in colour. Sodium-soap prepared from the oil has a pleasant odour and good lathering properties.

*See*–Medicinal Plants, Condiments and Spices, Vegetables.

## CRESENTIA CUJETE Linn.

FAM.–Bignoniaceæ.

COM. NS. :–*E.* Calabash tree ; *H.* Bilayati bel.

CHAR. :–A small tree of irregular growth bearing flowers which are in colour a mixture of green, purple, red and yellow, produced on the stem and older branches followed by a fruit somewhat resembling a pamelo with a hard rind.

DISTR. :–Cultivated occasionally in the gardens in the State ; A native of tropical America.

OIL :–The seeds yield a fixed oil similar to pea-nut or olive oils.

## CROTON OBLONGIFOLIUS Roxb.

FAM.–Euphorbiaceæ.

COM. NS. :–*H.* Chucka ; *M.* Gunsur.

CHAR. :–A middle-sized tree, 6-9 m. high, sometimes 12 m., girth 0·6-0·9 m. *Bark* 2·5 cm. thick, grey or brownish ; inner bark red, coarsely fibrous. Young parts and inflorescence clothed with silvery scales. *L.*–12·5-25 × 9-10 cm., oblong-lanceolate or elliptic-obovate, acute or acuminate, pale-green glabrous, dentate, crowded towards the apex of branches, petioles 2·5-5 cm., stipules small, caducous. *Fl.*–small, yellowish-green, male and female together on short pedicels in the axils of minute bracts in long terminal racemes. Calyx segments 5 ; petals woolly ; stamens 10-12 ; styles 3, 2-cleft. *Fr.*–capsule, sub-globose, 3-lobed. *Fl. t.*–Feb.-Apr. *Fr. t.*–Apr.-May. Leafless in the hot season.

DISTR. :–Rare. Southern Konkan. Kumta taluka of N. Kanara. South India, sub-Himalayan tract from Oudh and Gorakhpur eastwards ; Bengal, Bihar. The Santal Paraganas, Chota-Nagpur ; Burma, Ceylon.

OIL :–The seeds afford an oil (Gamble).

*See*–Medicinal Plants.

## CROTON TIGLIUM Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Purging Nut ; *G.* Nepal ; *H.* Gamalgota ; *K.* Danti ; *M.* Jamalgota.

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CHAR. :—A small evergreen tree ; young shoots sparsely hairy. *L.*—thinly membranous, ovate, serrate, 3-5 nerved. *Fl.*—male and female. *Fr.*—Capsule, white, ovoid, obtusely trigonous.

DISTR. :—Naturalised in South Konkan ; also cultivated ; Bengal, Assam ; Burma, Ceylon, China, Malaya Islands.

OIL :—The seeds yield an oil which is orange-yellow, of the consistency of nut-oil, has a slight odour resembling that of *jalap* and an acrid flavour ; and is used medicinally.

*See*—Medicinal Plants, Poisonous Plants.

## CUCUMIS MELO Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Sweet melon ; *G.* Chibdu ; *H.* Kharbuja ; *K.* Kalangida ; *M.* Chibuda.

CHAR. :—A creeping rough annual. *L.*—usually 5 angled, softly hairy. *Fl.*—yellow, male and female. *Fr.*—large spherical ovoid, elongated or contorted smooth or hairy.

DISTR. :—Cultivated in Gujarat and Deccan in the sandy beds of rivers ; Throughout India : Baluchistan and Tropical Africa.

There are two varieties—*Var.*—Momordica (*H.*—Phut) and *Var.*—utilissima (*M.*—Tarkakdi).

OIL :—The flattened seeds of all these yield an oil. The oil is pale yellow in colour with a pleasant odour and taste. The oil is edible and is also used for burning lamps.

*See* Fruits, Medicinal Plants.

## CUCUMIS SATIVUS Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Cucumber ; *G.* Kakari ; *H.* Khira ; *K.* Santekayi ; *M.* Kakdi.

DISTR. :—Largely cultivated in gardens all over the State, especially in the Deccan.

OIL :—The seeds yield an oil.

*See*—Vegetables, Medicinal Plants.

### CUCURBITA MAXIMA Duches.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Great Pumpkin, Red squash gourd; *G.* Koron; *H.* Kaddu; *K.* Kumbala; *M.* Tambda Bhopala.

DISTR. :—Cultivated all over the State.

OIL :—The seeds yield drak-brownish-red oil with a bland fatty taste and odour.

*See*—Medicinal Plants, Vegetables.

### CUCURBITA MOSCHATA Duches.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Musk-melon; *M.* Kala-bhopala, Kashi-phal.

DISTR. :—Cultivated all over the State.

OIL :—Seeds yield mild, bland, pale-coloured oil.

*See*—Vegetables.

### CUCUBBITA PEPO Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* The Pumpkin, Vegetable marrow; *G.* Dudia; *H.* Kumra; *K.* Kumbala; *M.* Kashiphal, Bhopala.

DISTR. :—Cultivated all over the State.

OIL :—The seeds yield a clear edible oil; the lower grades serve as burning oil.

*See*—Medicinal Plants, Vegetables.

### COMINUM CYMINUM Linn.

FAM.—Umbelliferaceæ.

COM. NS. :—*E.* Cumin; *G.* Jiru; *H.* Zira; *K.* Jirige; *M.* Jire.

DISTR. :—Cultivated throughout the State.

OIL :—The seeds yield a volatile oil. It is colourless or yellow when fresh, turning dark on keeping; used medicinally and also in perfumary. Seeds also contain a small quantity of fixed oil,

*See*—Medicinal Plants, Condiments and Spices.

## CURCUMA ZEDOARIA Rosc.

FAM.—Scitaminaceæ.

COM. NS. :—*E.* Zedoary ; *G.* Kachuri ; *H.* Hakhir ; *K.* Kachora ; *M.* Kachari, Kachora, Narakachora ; *Sk.* Gandhamulaka sara, Jatala, Karechura, Shathi.

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CHAR. :—Stemless herb ; root-stock of palmately branched, cylindric, oblong, annulate tubers, pale-yellow inside ; odour like camphor, taste bitterish spicy ; *L.*—4-6 with long petioles, 30-60 cm. long, obolong-lanceolate, clouded with purple down the middle ; *Fl.*—flowering stem 20-25 cm. long, appearing before the leaves, clothed with sheaths ; flowers yellow in spikes, flowering bract green tinged with red ; coma-bract crimson or purple ; *C.*—funnel shaped, lobed ; lip 3-lobed, deep-yellow ; *Fr.*—capsule, 3-gonous.

DISTR. :—Cultivated more or less throughout India ; said to be wild in E. Himalayas and Chittagong.

OILS :—Tubers yield an essential oil.

*See*—Dyes and Tans.

## CYMBOPOGON CITRATUS Stapf.

FAM.—Gramineæ.

COM. NS. :—*E.* Lemon grass ; *G.* Lilicha ; *H.* Gandhatrina ; *K.* Majjige hullu, Purhati hullu ; *M.* Gavati-chaha ; *Sk.* Bhustrina, Putigandha, Takratrina.

CHAR. :—A tall perennial, throwing up dense fascicles of leaves from a short rhizome ; culm stout, erect, up to over 1·8 m. high ; L.—linear tapering upwards to a point, up to over 90 cm. long ; glaucous green, smooth or rough upwards and long the margins , midrib whitish on the upper side. Ligule very short ; sheaths terte ; those of the barren shoots widened and tightly clasping at the base, others narrow and separating ; sheaths of the culm tight, velvety at the nodes ; *Fl.*—in decompound spatheate panicles 30 to over 60 cm. long, nodding.

DISTR. :—The grass is only known in the cultivated state, probably of Indian origin, and now widely distributed over the tropics of both the hemispheres.

OIL :—The grass yields a fragrant volatile oil, known as *Indian molissa oil.* The oil is obtained by subjecting fresh or partially dried and bruised grass to steam distillation. A yield of 0·2% or 20 lbs. per acre has been obtained. It is used in perfumary and is also used medicinally.

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## CYMBOPOGON MARTINI Stapf.

FAM.—Gramineæ.

COM. NS. :—*E.* Geramium grass ; *G.* Roshdo, Rhusghas ; *H.* Bujina, Mirchiagand, Rohisha ; *K.* Vasanchullu ; *M.* Roshagavat ; *Sk.* Bhutika, Rohisha, Saugandhika, Shyamaka.

CHAR. :—A tall perennial sweet scented grass, 1·5-2·4 m. high, stem, straw coloured, leafy ; *L.*—flat, usually broad, subcordate or rounded at the base, glaucous beneath, those below the inflorescence 23 cm. × 1 cm., up to 2·3 cm., wide below ; margins scabrid ; *Fl.*—spikes 2-nate, 12-18 mm. long, oblique or divaricate ; *Fl. t.*—Oct.-Nov.

DISTR. :—Punjab, Sind, Baluchistan, Afghanistan, throughout N. Africa to Morocco.

OIL :—There are two varieties of this grass, Motia and Sofia. They are morphologically indistinguishable, but have different habits and grow under different ecological conditions.

MOTIA :—It is not gregarious and it occurs in patches. It grows in open forests or clearings on dry sunny slopes. It yields the commercial important Palmarosa oil also kuown as Rosha or East Indian Geranium oil. The oil is extracated by distillation in crude iron or copper stills. Better quality oil is obtained in a higher yield by stem distillation. Equally good yields are obtained by using improved direct-fired stills having false bottoms, over which the grass is charged. Palmarosa oil is extensively used in India for adulterating *Attar* of Roses. It is used as a base for several perfumes and cosmetics and also as a soap perfume. Until recently India was the only source of supply of this oil. The major portion of the oil is chiefly exported from Bombay.

SOFIA :—It is gregarious and covers considerable areas. It grows in lower altitudes and valleys, in shady *nallahs* and dense moist areas with poor drainage. It yields on distillation Ginger-grass oil not as valuable as Motia but commercially important. This oil is chiefly used as a soap-perfume.

## CYNOMETRA RAMIFLORA Linn., Var.
## MIMISOIDES Baker.

FAM.—Cæsalpinaceæ.

COM. NS. :—No common names.

CHAR. :—An evergreen tree. Bark smooth, brownish grey. *L.*—7·5-12·5 cm. long ; rachis grooved. Leaflets 2 pairs 4-9 ×2·.4 cm., coriaceous, obliquely obovate-oblong, emarginate, dark-green,

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glabrous, shining above. *Fl.*—in small axillary corymbose racemes. Calyx tube very short; segments ovate-lanceolate. Petals white, linear lanceolate. *Fr.*—pod, fleshy, much wrinkled, turgid, 1·3-2·5 cm. long, irregularly oblong or ovoid with a thick fleshy pointed tip. *Fl. t.*—Mar.-May. *Fr. t.*—ripe Aug.-Sept.

DISTR. :—Western Peninsula in the forests of Konkan and North Kanara; growing near the sea-coast; Sundribans; Burma, Malaya.

OIL :—The seeds yield an oil which is externally applied in skin-diseases.

## CYPERUS ROTUNDUS Linn.

FAM.—Cyperaceæ.

COM. NS. :—*G.* Motha; *H.* Motha, Mutha; *K.* Koranarigadde, Tungegaddo; *M.* Bimbal, Nagarmotha, Motha; *Sk.* Bhadramusta, Granthi, Kachhola, Mustaka, Sugandhi-granthila.

CHAR. :—Glabrous herb; stolons elongate, bearing hard ovoid tunicate fragrant tubers, 0·8-2·5 cm.; stems subsolitary 10-75 cm.; *L.*—shorter or longer than the stem, narrowly linear; *Fl.*—in simple or compound umbel, rays 2-8 bearing short spikes of 3-10 spreading red brown spikelets; spikelets 10-50 flowered; *Nut*—broadly ovoid, trigonous, greyish black; *Fl. t.*—Sept.-Nov.

DISTR. :—Throughout India, Ceylon, most hot countries.

OIL :—The rounded rhizomes are said to yield an essential oil which the people of upper India use to perfume their clothes. Tubes also yield a fatty oil.

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*See*—Medicinal Plants.

## DALBERGIA SISSOO Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Sissoo; *G.* Sisam, Tanach; *H.* Shisham, Sissu, Sissai; *K.* Biridi; *M.* Shisavi; *Tr.* Sissoo.

CHAR. :—A handsome deciduous tree with an erect trunk about 8 m. high; girth 1·8-3·6 m. *Bark* grey exfoliating in narrow longitudinal stips. Young parts and branches grey downy. *L.*—alternate, imparipinnate, on a zig-zag petiole. Leaflets 3-5, 2·5-3·5 cm. each way, orbicular, with a sudden long acumination, entire, firm, glabrescent. *Fl.*—yellowish-white, nearly sessile, in densely pubescent axillary panicles, much shorter than the leaves. Calyx campanulate, pubescent; teeth very short; 2 upper ones obtuse, 3 lower acute; the central one the largest. Corolla twice the length of the calyx; standard with a long claw. Stamens 9, monadelphous; sheath

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open on the upper side. *Fr.*—legume, thin, linear-lanceolate, pale-brown, glabrous, with a stalk twice as long as the calyx, generally 2-3 seeded. Seeds compressed, reniform. *Fl. t.*—Mar.-June. *Fr. t.*—Nov.-Feb. Sheds leaves Dec.-Jan. New leaves Feb.-Mar.

DISTR. :—Planted throughout the State; believed to be indigenous in Gujarat; in river beds of sub-Himalayan tract from the Indus to Assam; plains of Madhya Bharat: Baluchistan.

OIL :—The seeds on expression give an oil. The wood is said to yield an oil used medicinally.

*See*—Fodder Plants.

## DALBERGIA LATIFOLIA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Black-wood of Bombay, Rosewood of S. India; *G.* Sissu; *K.* Biti, Thodagatti; *M.* Kalarukh, Sissum, Sissoo; *Tr.* Rosewood or Bombay Black-wood.

CHAR. :—A tall deciduous tree, trunk erect, 18-24 m. high, girth 0·9-1·8 m. (sometimes even 6 m.). *Bark* grey with irregular short cracks, exfoliating in thin, fibrous, longitudinal flakes, Glabrous. L.—10-18 cm. on straight petiole. Leaflets usually 5 (3-7), 4-6·5 cm. long and broad, often emarginate at the apex, cuneate at the base, entire, somewhat undulate, coriaceous, green or whitish beneath, on petiolules 3-4 lin. *Fl.*—small, greenish or white, on short pedicels, forming lax, branched and divaricating panicles, shorter than the leaves. Calyx segments oblong, obtuse, shorter than the tube. Stamens 9, monadelphous; sheath open on the upper side. *Fr.*—legume, oblong-linear or oblong-lanceolate, firm brown, 4-7·5 × 0·7-2 cm. 1-4-seeded. *Fl. t.*—hot season. *Fr. t.*—Dec.-Jan. Sheds leaves in Feb.-Mar.; new leaves Apr.-May.

DISTR. :—Throughout the Western Ghats and in the deciduous forests of the State. Common in S. Konkan and S. M. Country; Madhya Bharat, E. Bengal, Oudh, Sikkim, Burma.

OIL :—The seeds on expression yield an oil. Nothing is known about its use.

*See*—Fodder Plants.

## DALBERGIA LANCEOLARIA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Gengri; *H.* Bithua, Takoli; *K.* Harrani; M. Dandous, Kaurchi.

CHAR. :—A beautiful deciduous tree with a straight trunk, 9-12 m. (in some places 18-24 m.) high; girth 1·2-1·5 m. *Bark* compact, grey, exfoliating in thin rounded patches, glabrous.

*L.*—7·5-15 cm., imparipinnate. Leaflets 11-15, 2·5-5 × 2·5 cm., oval, or broadly oblong, emarginate, obtuse or retuse, coriaceous, green above, and rather glaucous below. *Fl.*—pale-blue, on short slender pedicels, arranged in large, lax, terminal and axillary panicles; branches of panicles sub-glabrous, or clothed with rufous pubescence. Calyx hoary, the teeth obtuse, the lowest rather longer and narrower. Corolla 2-3 times as long as the calyx; standard obovate; keel much shorter than the wings. Stamens 10, diadelphous. *Fr.*—legume, 4-10 × 2·6 cm., brown, flexible, narrowed at both ends, with a long stalk. Seeds 1-4 (usually 2). *Fl. t.*—Mar.-May. *Fr. t.*—ripens next cold season and remains long on the tree.

DISTR. :—Plains from the W. Himalayas to Ceylon. In the deciduous forests of N. Kanara from Mundgod to Siddapur, common; Konkan and Khandesh.

OIL :—The seeds on expression yield an oil used medicinally especially in rheumatic affections.

*See*—Fodder Plants.

## DAUCUS CAROTA Linn.

FAM.—Umbelliferaceæ.

COM. NS. :—*E.* Carrot; *G.* Gajar; *H.* Gajra; *K.* Gajjari; *M.* Gajar.

DISTR. :—Cultivated in gardens all over the State; mostly in the Deccan and Karnatak.

OIL :—The seeds yield an oil by distillation. It is a pale-yellow volatile oil. It has a strong penetrating odour and a somewhat unpleasant taste .

*See*—Vegetables, Medicinal Plants.

## DIOSPYROS EMBRAYOPTERIS Pers.

FAM.—Ebenaceæ.

COM. NS. :—*E.* Riber Ebony, Wild Mangosteen; *G.* Zeeberwo; *H.* Gale, Kala-tendu, Makurkendi, Tendu; *K.* Banda, Gavandu, Tumari, Tumaki-mara; *M.* Temburni, Timbwini; *Tr.* Ebony.

CHAR. :—A small evergreen tree, branches forming a dense shady head, 9-10·5 m. high, girth about 1·2 m. *Bark* smooth, dark-grey, almost black, with a greenish tinge. Leaf bud silky with adpressed hairs. *L.*—13-20 × 5 cm., alternate, short-petioled, coriaceous, smooth, shining, linear-oblong on thick wrinkled petioles. *Fl.*—white, fragrant, tetramerous; male peduncles axillary, length of petiole drooping, 3-6 flowered, furnished with a small deciduous bract,

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anthers 40 on 20 filaments; female axillary, solitary, larger than the male, on short recurved pedicel. Staminodes 1-4. Ovary globular, hairy. 8-12-celled. Styles 4-6. Stigma branched, usually 2-3 fid. *Fr.*—4-5 cm. diam., globular, rusty-yellow when ripe, covered with a rusty, meal-like tomentum. Seeds usually 5-8, immersed in viscid glutinous pulp, reniform. *Fl. t.*—Mar.-May. *Fr. t.*—cold season.

DISTR. :—Near creeks and back-waters, along the coast of N. Kanara, and the Konkan; in the rain forests and river-beds in the ghats. Throughout India from the Himalayas to Ceylon. Common in Bengal, Siam, Malaya Archipelago.

OIL :—The seeds yield an oil by boiling; used medicinally.

*See*—Medicinal Plants, Fodder Plants. Gums & Resins.

### DIPTEROCARUPUS TURBINATUS Gærtn.

FAM.—Dipterocarpaceæ.

COM. NS. :—*E.* Wood oil tree; *G.* Gurjan; *K.* Challans; *M.* Challon.

CHAR. :—A tall tree; trunk straight; bark deeply cracked. *L.*—large, ovate,, entire or crenate, glabrous, shining above, *Fl.*—large, in axillary 3-8 flowered racemes, white tinged with red. *Fr.*—small, subglobose, hairy.

DISTR. :—Sparingly in the Southern forests in the State; Southern ghats of N. Kanara; Eastern coast; Eastern Bengal, Pegu, Singapore, Andamans.

OIL :—It produces the celebrated *Gurjan* or *Kanyin* oil.

*See*—Gums and Resins.

### DOLICHOS BIFLORUS Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Horse gram; *G.* Kuthi; *H.* Gahat, Kulthi; *K.* Hurali; *M.* Kulith.

DISTR. :—Cultivated. Grown extensively in the Deccan districts, to a certain extent in S. M. Country.

OIL :—The beans are said to yield an oil about which little is known.

### ELÆIS GUINEENSIS.

FAM.—Palmaceæ.

COM. NS. :—E. Red Oil-Palm.

CHAR. :—A stately erect tall handsome palm with a stout stem and large pinnate leaves of dark green colour. *Fr.*—red in large, some-what obovate heads.

They form excellent decorative plants in a young state.

DISTR. :—Cultivated in gardens (there are some palms planted along the roadside in the garden of the Law College, Poona). A native of Tropical Africa

OIL :—This specie yields the welknown palm oil of commerce. The outer covering of the fruit yields the red palm-oil, which is used in W. Africa for cooking and to some extent for burning, being obtained by boiling or pounding. It is largely exported as a lubricant and in the manufacture of soap, and in the tin-plate industry. Distinct from this is the " Kernel or white oil " obtained by pressing the kernels by machinery or solvents, which is the more valuable and is largely used for margarine and cooking fats.

The residual cake is a good food for cattle. Efforts are being made to grow it in India.

## ELETTERIA CARDAMOMUM Maton.

FAM.—Scitaminaceæ.

COM. NS. :—*E.* Malabar cardamon ; *G.* Elchi ; *H.* Choti-elchi ; *K.* Yalakki ; *M.* Veldoda.

DISTR. :—Cultivated in the Western valleys of North Kanara.

OIL :—An essential oil is extracted from the fruit by aqueous distillation. It is of pale-yellow colour and has the flavour and odour of cardamon. The oil is used both in pharmacy and perfumery. It occurs to the extent of 4% to 8% by weight of the seeds and contains a considerable amount of terpinylacetate.

*See*—Medicinal Plants, Condiments and Spices.

## ENTADA PHASEOLOIDES Merr.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Giant's rattle, Lady nut, Mackary bean ; *K.* Doddakampi ; Hallekayiballi ; *M.* Carambi, Carbe.

CHAR. :—An immense woody climber with a thick trunk ; branches terete, glabrous ; *L.*—2-pinnate, main rachis grooved ending in a bifid tendril ; pinnæ 2-3 pairs, stalked ; leaflets 7·5 × 2·3-2 cm., oblong or obovate, rigidly coariaceous, dark green ; *Fl.*—in panicled or simple spikes 15-25 cm. long, axillary or from the nodes of old branches ; *C.*—yellow ; *Fr.*—pod, 30-90 cm. long, 3-7·5 ×7·5-10 cm. wide and 3-8 cm. thick, slightly curved, woody, indented between the seeds ; *Sd.*—6-15, orbicular, 4·5-5-7 cm diam., compressed, smooth, shining and brown ; *Fl. t.*—Mar.-May.

DISTR. :—Central and Eastern Himalayas, Nepal, W. Peninsula, Ceylon, the tropics generally.

OIL :—An oil is said to be expressed from seeds, the properties of which are not known.

*See*—Fibres.

### EUCALYPTUS sp.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Blue-gum tree.

CHAR. :—Very tall trees with smooth whitish bark; branches more or less drooping. Leaves large, linear-lanceolate or ovate with an agreeable odour.

DISTR. :—Planted in gardens and near Sanatoriums in the State; very common on the Nilgiris in South India. Native of Australia.

OIL :—The leaves yield a strong pungent essential oil, valued in medicine as an antiseptic and febrifuge; also used in perfumery.

As much of the oil comes from the Nilgiri hill district, it is sold in the market as 'Nilgiri Tel'. No oil is manufactured in the Bombay State.

*N. B.*—There are many species grown in the gardens in the Bombay State only for ornamental or hygienic purposes.

### EUPHORBIA DRACUNCULOIDES Lamk.

FAM.—Euphorbiaceæ.

COM. NS. :—No names.

CHAR. :—An annual much branched herb; stems many from the root, erect, leafy. *L.*—of the stem linear-lanceolate; floral leaves broader and shorter. Involucre bell-shaped, solitary. *Fr.*—Capsule very small. Seeds grooved down one side, whitish, rugose.

DISTR. :—Deccan—Mawal. S. M. Country; Throughout India in the plains and low hills: Sind, Arabia, Tropical Africa.

OIL :—Fruits yield a limpid, clear oil, of a yellowish or greenish-yellow colour; used as a drying oil or for burning.

### FERONIA LIMONIA Swingle.

### (FERONIA ELEPHANTUM Coit.)

FAM.—Rutaceæ.

COM. NS. :—*E.* Elephant or Wood apple; *G.* Kavit, Kotha; *H.* Bilin, Kait, Kat-bel; *K.* Beloda, Byala, Malura, Manmadha; *M.* Kavath, Kavit.

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CHAR. :—A deciduous tree, armed with strong, straight axillary thorns, 6-9 m. high and 0·6-1·2 m. girth. *Bark* grey or nearly black, very rough, thick, wrinkled, with longitudinal shallow furrows. *L.*—5·2-10·4 cm., alternate, imparipinnate, quite glabrous, shining, Petiole slightly winged or not. Leaflets 5-7, about 3·1 cm. long, opposite, lanceolate, cuneate or obovate, obtuse, entire or crenate towards the apex, membranous, almost sessile. *Fl.*—polygamous by abortion, dull red, on slender pedicels, in terminal or axillary, lax panicles. Calyx small, 5-toothed, deciduous. Petals 5, sometimes 4-6, spreading, imbricate. Stamens 10-12, inserted around a short disc. Filaments dilated at the base. Anthers linear-oblong. Ovary in the male flower small, obortive; stigma 5-lobed. Ovary in the female flower, oblong, 5-6 celled, or at length 1-celled. Style none; stigma large, 5-lobed, deciduous. *Fr.*—berry, large, 6·5 cm. diam., or larger, globose, woody, hard, grey-coloured, rough, 1-celled, many-seeded. Seeds numerous, imbedded in a fleshy edible pulp. *Fl. t.*—Feb.-Apr. *Fr. t.*—rainy season; sheds leaves during hot season.

DISTR. :—Common in Konkan and Deccan, throughout India in dry situations. Often cultivated; indigenous in S. India; Java, Ceylon, Burma.

OIL :—The seeds are reputed for affording an oil used against itch. The leaves yield on distillation a small quantity of essential oil similar to that obtained from *Bel* leaves.

*See*—Medicinal Plants, Gums and Resins, Fodder Plants, Sacred Plants.

## FLACOURTIA CATAPHRACTA Willd.

FAM.—Flacourtiaceæ.

COM. NS. :—*H.* Paniala, Talispatri; *K.* Abblu, Talispatri; *M.* Juggum, Jugguru.

CHAR. :—A small deciduous tree, 9-75-m. high, with a girth 0·9-1·5 cm. The trunk armed with numerous large compound thorns; branches numerous, the young ones slightly pubescent, generally unarmed, except close to the trunk. *L.*—1·8-10·4 × 2·6-4·6 cm., ovate to oblong, lanceolate, acuminate at the apex, rounded or acute at the base, crenate-serrate, membranous, shining, green on both sides, glabrous. Racemes shortly tomentose or puberulous, 5-10 flowered, often arising from the lateral branchlets, a small cordate bract under each pedicel. *Fl.*—Male calyx 4-5 partite. Stamens inserted into a glandular convex disc. Female calyx of 4-6, spreading sepals, with annular-lobed disc surrounding the ovary. Styles 4-6, short, connate at the base; stigmas dilated, almost horse-shoe-shaped, or capitate. *Fr.*—berry, oblong or ovoid, size of a plum, bluish-black containing 10-14 compressed seeds. *Fl. t.*—Jan.-Feb. *Fr. t.*—May. Sheds its leaves in the hot season.

DISTR. :—Cultivated and wild in Konkan ; South Kanara, Malbar ; Sub-Himalayan tract from Dehra-Dun (damp-forests) eastwards to Chota-Nagpur, Bengal, Assam to Chittagong ; Burma, Malacca, Singapore and the Malay Islands.

OIL :—The seeds yield an oil about which little is known. Further information regarding it might lead to the opening up of a trade in an article which even the poorest cultivator might supply from the wild plant.

*See*—Fruit Trees (w).

### FOENICULUM VULGARE Gærtn.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Fennel, Finkel ; *G.* Variari, Variali ; *H.* Soupa ; *K.* Badisoppu ; *M.* Badishep ; *Sk.* Bhuripushpa, Potika, Shalina, Shateya, Tapaspriya.

CHAR. :—A tall glabrous, dark green, annual, 0·6-0·9 m. high ; *L.*—decompound, ultimate segments linear ; *Fl.*—in large umbels ; bracts and bracteoles absent ; yellow ; *Fr.*—ellipsoid, ridges prominent, furrows vittate, carpophore 2-partite.

DISTR. :—Apparently a native of S. Europe but now diffused over temperate and sub-tropical regions of the world.

OIL :—The fruit contains a volatile oil, pale-yellow with a pleasant aromatic odour. It is used in the manufacture of cordials. It is a fairly good vermicide against hook-worms.

*See*—Condiments and Spices.

### GARCINIA CAMBOGIA Desr.

FAM.—Guttiferеæ.

COM. NS. :—*K.* Dharambe, Upagimara, Manthulli ; *M.* Vilaiti amli.

CHAR :—An evergreen middle-size tree. Grows to a considerable size in favourable places. *Bark* ·67 cm. thick, grey, smooth, lenticillate, containing abundance of bright yellow gamboge. *L.*—5·2-15·6 × 1·34-3·96 cm., oblong, elliptic or lanceolate, acuminate, attenuated at the end, coriaceous, dark-green, shining above. *Fl.*—polygamous ; yellow, 2 cm. diam., hermaphrodite larger, terminal or axillary, solitary or in fascicles, sessile or pedicelled. *Male fl.*—thickened towards the tip. Sepals with narrow membranous margins, outer sepals smaller. Petals twice as long as sepals, concave. Anthers numerous (12-20 or more), adnate to a short androphore; cells dehiscing longitudinally, introrse. *Female fl.*—staminodia surrounding the base of the ovary in several phalanges, each consisting of 2-3 sterile stamens. Ovary 6-10-celled; stigma 6-10, free nearly to the base. *Fr.*—succulent, 6·54-7·8 cm. diam., ovate or oblong-ovoid, yellow or reddish, 6-10 furrowed; furrows with angular edges ending about the middle; the apex is flat, depressed, or nipple-shaped. Seeds 6-8, with pulpy aril. *Fl. t.*—Feb.-Mar. *Fr. t.*—June-July.

DISTR. :—Evergreen forests of the Western ghats from Kanara southwards, abundant in N. Kanara, Madras; both the Peninsulas; Eastern Himalayas, Eastern Bengal; Burma, Penang and the Andaman Islands. Also cultivated in gardens.

OIL :—The seeds yield an oil used medicinally.

*See*—Gums and Resins.

## GARCINIA INDICA Chois.

FAM.—Guttifereæ.

COM. NS. :—*E.* Wild-mangosteen; *G.* Konkam; *H.* Kokum; *K.* Murgal; *M.* Bhirand, Ratamba, Kokamb.

CHAR. :—A tall slender tree with drooping branches. *Bark* light brown, spiny, very thin, smooth. *L.*—8·54-8·13 cm., obovate or lanceolate, obtuse, acute or acuminate, dark green, red when young. *Fl.*—yellowish. *Male* in axillary and terminal fascicles on pedicles 2·6-4 cm. Sepals orbicular. Petals rather larger. Stamens 12-20, forming a short capitate column; anthers opening longitudinally. Female solitary and terminal on a thick peduncle. Staminodes arranged in 4 bundles. Ovary 4-8 celled; stigma usually 8-lobed. *Fr.*—deep-purple, globose, as large as a small orange, not furrowed, 4-8-seeded. *Fl. t.*—Nov.-Feb. *Fr. t.*—Apr.-May.

DISTR. :—Tropical rain forests; Western coasts and W. ghats; Matheran; common in S. Konkan and N. Kanara evergreen forests. Often planted in the gradens in Konkan; cultivated in Mauritius.

OIL :—A valuable oil "Kokam butter" is obtained from the seeds to the extent of 30%. The oil is extracted in the cool season by either of the following three methods. (1) By boiling in water the pulp of the kernel. (2) By churning the pulp with water. (3) By pressing kernels in oil-mills. It is used medicinally. It is much used in the preparation of ointments, suppositories and is used for other pharmaceutical purposes. It is a pale-yellow oil which remains soild at the temperature of 98° F.

*See*—Medicinial Plants, Dyes and Tans.

SECTION 2.

Oil Plants.

## GARCINIA MORELLA Desr.

FAM.—Guttifereæ.

COM. NS. :—*E*. The Gamboge Tree. *K*. Arsina-gurgi, Hardala.

CHAR. :—A middling sized tree with spreading branches; young branches quadrangular. *L*.—elliptic-obovate, narrowed at the base. Male flowers axillary in fascicles of 2-5; stamens many combined to form a centrol column. Female flowers axillary, solitary. *Fr*.—small, subglobose.

DISTR. :—Kanara—evergreen forests; Eastern Bengal, Khasia hills. Western Peninsulla.

OIL :—A semi-solid fat of a yellow colour is obtained in moderate quantities from the seeds. It is employed as a lamp-oil by better class of people and as a substitute for ghee by the poor. It might prove of value to the candle-makers.

*See*—Gums and Resins, Dyes and Tans.

## GIVOTIA ROTTLERIFORMIS Griff.

FAM.—Euphorbiaceæ.

COM. NS. :—*K*. Bettitalai, Butala, Pulkeer; *M*. Polki.

CHAR. :—A middle-sized dioecious tree with stout branches. *Bark* brown, smooth, 1·3 cm. thick, peeling off in circular thick bosses, leaving pits; young shoots, inflorescence and under side of leaves densely grey-tomentose with stellate hairs. *L*.—10-15 × 8-15 cm., alternate, broadly ovate or rotundate, acute at the apex and a cordate base, sometimes slightly lobed and distantly crenate, glabrous by age, but grey tomentose beneath; petiole 7·5-12·5 cm., sometimes with 2-3 glands above the middle. *Fl*.—in axillary slender panicles, 15·5-25 cm., calyx 5-cleft. Petals alternating with the sepals. Disc. somewhat lobed, pubescent. Styles 2-cleft to the middle. *Fr*.—oblong, ellipsoid, fleshy, size of pigeon's egg; seeds globose, pale-coloured. *Fl. t*.—hot season. *Fr. t*.—Sept.-Oct.

DISTR. :—Throughout the dry districts of the Deccan, abundant in the Belgaum district, near Sutgutti; in dry, deciduous, open jungles on the lower Cuddapah quartzite. Katraj ghat near Poona. Dharwar and Bellary southwards in the Deccan Peninsulla, Ceylon.

OIL :—The seeds yield an oil, which is valuable as a lubricant for fine machinery.

### GLYCINESOJA Sieb. & Zucc.

FAM.—Papilionaceæ.

**SECTION 2.**

**Oil Plants.**

COM. NS. :—*E.* Soya Bean.

CHAR. :—An erect hairy bushy annual. Leaflets 3, ovate. *Fl.*—small white to purplish in short axillary racemes. *Pods* narrow, flat with constrictions between the seeds. Seeds 2-4, globose, brownish-yellow or black.

DISTR. :—Occasionally cultivated on Government farms in the State . China, Japan.

OIL :—The seeds yield an oil. It bears a general resemblance to the ordinary edible oils of commerce. It is said that they obtain 17% oil by simple pressure. It is useful for burning. When exposed to low temperatures it becomes pasty and oxidises rapidly on exposure to air. As a drying oil it might replace linseed oil to some extent. Large quantities of seeds are annually used by the Chinese for the manufacture of edible oil.

### GOSSYPIUM SPECIES.

FAM.—Malvaceæ.

COM. NS. :—*E.* Cotton ; *G.* Kapas ; *H.* Kapas ; *K.* Hali ; *M.* Kapus.

DISTR. :—Cultivated.

OIL :—From the cotton seed a very pure valuable oil is extracted. The oil on refining yields the finest grades of both cooking and salad oil, besides the inferior type used in soap-making. The refined oil is converted into solid fats by hydrogenation and then is used for preparing margarin which is used as a substitute for butter. Cotton seed oil makes a good liniment in rhematic affections. It can be used for burning in lamps. In India the villagers believe in the antidotal virtues of cotton-seed oil when used in cases of poisoning from narcotics.

*See*—Fibres, Sacred Plants.

### GUIZOTIA ABYSSINICA Cass.

FAM.—Compositæ.

COM. NS. :—*E.* Niger seed ; *G.* Ram Tal ; *H.* Ram Til ; *K.* Gurellu, Huchellu ; *M.* Karale.

CHAR. :—A stout erect herb up to a meter high. *L.*—partially stem-clasping, ovate or subcordate, serrate, *Fl.*—heads numerous, conspicuous, involucral bracts 5, ovate, green ; achens black and shining, angular.

SECTION 2.
Oil Plants.

DISTR. :—Cultivated as a minor crop all over the State, Poona growing the highest acreage. A native of Tropical Africa.

OIL :—The seed contains from 41 to 43% of oil and in the country oil-press it yields from 30-32%. It is a clear pale, yellow, limpid, sweet oil; it is largely used for cooking purposes. In the Deccan it is the chief substitute for ghee amongst the poorer classes. It is also extensively used to adulterate gingely and castor oils.

### GYNANDROPSIS PENTAPHYLLA DC.

FAM.—Capparidacæ.

COM. NS. :—*E.* Caravella ; *G.* Adiyakharan, Sati talvani, Tanmani ; *H.* Churota, Hulhul, Karalia ; *K.* Shrikala ; *M.* Kanphodi, Mabli, Pandhari tilwan ; *Sk.* Arkapuspika, Bastagandha, Hulhul Kabari, Karnasphota, Tilparni, Ugragandha.

CHAR. :—An annual erect herb 0·6-1·2 m. high, stem and branches hairy ; *L.*—3-5 foliate, petioles sometimes armed with small prickles ; leaflets subsessile elliptic-obovate, pubescent, margins crenate-denate ; *Fl.*—in dense bracteate racemes, pedicels viscid hairy ; *C.*—petals 4 with long slender claws, pink ; gynophore 2-2·5 cm. long ; *Fr.*—capsule viscid, hairy, 5-9 cm. long, tapering at both ends ; *Sd.*—muricate, dark-brown ; *Fl. t.*—June.

DISTR. :—A common weed in all tropical countries.

OIL :—The seeds yield an oil having the properties of garlic or mustard oil.

### HELIANTHUS ANNUUS Linn.

FAM.—Composilæ.

COM. NS. :—*E.* Sun-flower ; *G.* Surajmaki ; *H.* Suryaphula.

CHAR. :—A large hairy shrub. *L.*—large whitish green. *Fl.*—heads large, ray florest, yellow ; seeds large.

DISTR. :—Common in gardens throughout the State ; in gardens throughout India. Native of Western United States of America.

OIL :—The oil, obtained by expression from the seeds, is the most important product of sun-flower and is valuable for many purposes. When pure, it is said to be equal to olive or almond oil for culinary and table purposes. It is much used for adulterating these oils. The chief industrial applications of the oil are for wool-dressing, lighting, candle and soap making ; for the last mentioned purpose, it is superior to most oils.

The oil-cake is a valuable food for cattle and poultry.

*See*—oils.

## HOLARRHENA ANTIDYSENTERICA Wall.

FAM.—Apocynaceæ.

SECTION 2.
Oil Plants.

COM. NS. :—*E.* Conessi bark tree, Kurchi tree ; *G.* Hath, Kaduoindrajav, Kuda ; *H.* Dudhi, Karohi, Karuindrayan, Kura ; *K.* Hale, Kodasige, Kudsalu, Veppale ; *M.* Kuda, Pandhara Kuda ; *Sk.* Indrayana, Kaling, Kutaja .

CHAR. :—A large shrub or a small deciduous tree, branchlets drooping ; *L.*—10-20 × 5-11·5 cm., broadly ovate or elliptic ; main nerves conspicuous ; *Fl.*—in terminal corymbse cymes ; inodorous ; *C.*—tubular, white ; throat hairy inside ; *Fr.*—follicles 20-48 cm. long, cylindric, often dotted with white spots ; *Sd.*—with deciduous coma of brown hairs ; *Fl. t.*—Feb.-June.

DISTR. :—Tropical Himalayas from the Chenab westwards ; throughout India to Travancore and Malacca.

OIL :—The seeds yield about 20% of a fixed oil of greenish-yellow colour ; it has a peculiar odour but is bland in taste.

*See*—Timbers, Fodder Plants.

## HYDNOCARPUS LAURIFOLIA Denn.

## (HYDNOCARPUS WIGHTIANA Blume.)

FAM.—Flacourtiaceæ.

COM. NS. :—*K.* Bhutabi, Garudphala, Niradivittulu ; *M.* Kadukavata, Kastel, Kowti ; *Sk.* Garudphala.

CHAR. :—Large evergreen tree 12-15 m. high, young parts brown pubescent ; *L.*—ovate or oblong lanceolate, acuminate, more or less coriaceous ; 12·5-23 × 3·8-7·5 cm. ; *Fl.*—solitary or in racemes, white, diœcious ; *C.*—petals fringed with soft white hairs ; *Fr.*—berry, globose or ovoid, size of small apple, tomentose ; *Sd.*—numerous, broadly ovate, flat ; *Fl. t.*—Jany.-Apl.

DISTR. :—Endemic in tropical forests along the W. Ghats, Malabar, common in Travancore.

OIL :—The seeds yield, by expression or on boiling in water, about 44% of a fatty oil which has a sherry-yellow colour but has no taste or odour. It resembles *Choulmogra* oil both in physical characters and chemical composition. It is used medicinally. It is chiefly used as a lamp-oil in Goa (Lisboa).

*See*—Poisonous Plants, Fish Poisons.

## IMPATIENS BALSAMINA Linn.

VAR.—Coccinea.

FAM.—Balsaminaceæ.

SECTION 2.
Oil Plants.

COM. NS. :—*E.* Balsam ; *H.* Gulmendi ; *M.* Terada.

CHAR. :—An annual erect herb. *L.*—alternate, lanceolate, deeply serrate. *Fl.*—medium sized, rose-coloured, showy ; spur long and slender. *Fr.*—Capsule, hairy.

DISTR. :—This is the common form in the Bombay State. Western ghats, widely. Hills north of Belgaum. Konkan.

OIL :—The seeds give an oil on expression ; it is burnt in lamps by the people in Chamba.

## JASMINUM GRANDIFLOAUM Linn.

FAM.—Oleaceæ.

COM. NS. :—*E.* Catalonian-Spanish jasmin ; *G.* Chambeli ; *H.* Chambali ; *K.* Ajjige, Anemallige, Jajimalle ; *M.* Jai ; *Sk.* Chambeli, Jati, Priyavanda, Surabhigandha.

CHAR. :—A large subscandent shrub ; *L.*—opposite, imparipinnate, 5-12·5 cm., petiole and rachis margined ; leaflets 7-11, terminal rather larger ; distal pair confluent with the terminal, proximal petiolulate, intermediate sessile ; *Fl.*—3·8 cm. across, white, often tinged with pink outside, in lax axillary and terminal cymes ; *Fr.*—ripe carpels 2 ; *Fl. t.*—July-Sept.

DISTR. :—Cultivated throughout India ; wild in the sub-tropical Himalayas Salt Range, Trans-Indus regions eastwards to Kumaon, hills of Rajastan and Madhya-Bharat.

OIL :—The fragrant flowers are used in India for preparing a scented oil which is considered cooling and is much prized by the richer class of people. The flowers are employed for making perfumed water in Kumaon. In Europe the flower is very highly esteemed owing to the delicacy and sweetness of its odour. The method of obtaining the odour is by absorption or enfleurage. In this process the flowers are sprinkled over by a layer of lard or beef suet, the operation being repeated every few days with fresh flowers. The grease absorbs the odour and is finally melted at as low temperature as possible and strained. Oils are similarly prepared ; a cotton cloth steeped in olive oil being substituted for the layer of lard. The extract of Jasmine is prepared by adding one quart of rectified spirit to 2 lbs. of Jasmine fat or oil and leaving the mixture to stand for a fortnight at summer heat. The extract is then strained off and the scented residue of fat or oil is sold as pomatum or hair-oil. The extract is highly valued and enters into the composition of a great many of the handkerchief-perfumes of Europe. The perfumed oil is used medicinally.

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—
Oil Plants.

## JASMINUM SAMBAC Ait.

FAM.—Oleaceæ.

COM. NS. :—*E.* Arabian Lily, Sambac, Tuscan jasmine ; *G.* Mogro ; *H.* Banmallika, Chamba, Mogra, Motia ; *K.* Mallige, Iravantige ; *M.* Mogara ; *Sk.* Ananga-mallika, Navamallika, Pramodini, Vanchandrika.

CHAR. :—A sub-erect shrub, scarcely climbing ; *L.*—opposite, membranous, variable in shape, usually broadly ovate or elliptic, entire, base rounded or subcordate ; *Fl.*—white, very fragrant, solitary or usually in 3-many flowered terminal cymes ; *Fr.*—ripe-carpels 1-2, sub-globose, black, surrounded by calyx-teeth ; *Fl. t.*—more or less throughout the year ; abundant in April-May.

DISTR. :—Cultivated throughout India ; in the tropics of both the hemispheres.

OIL :—The fragrant flowers give a considerable proportion of oil of Jasmine used in India like the oil of the preceding species. The method of *enfleurage* resorted to in India for extracting the odorous principle is by the use of crushed sesamum seeds instead of lard.

The following Jasminum sp. are likely to give oil on distillation from the fragrant flowers.

## JASMINUM OFFICINALE Linn.

COM. NS. :—*M.* Jai. The common white jasmine. Native of Kashmir, Afghanistan ; Cultivated in India, China and Europe. Flowers are white and very fragrant.

## JASMINUM CALOPHYLLUM Wall.

COM. NS. :—*M.* Sayali —a beautiful scandent shrub, native of the Nilgiris ; Flowers pure white and fragrant. Cultivated in—gardens in the State.

## JATROPHA CURCAS Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Barbados Physic nut ; *G.* Jangali erandi, Ratanjot ; *H.* Jangali-pahari erand ; *K.* Adalu-Dodda Kade-Mar-haralu, Dundigu ; *M.* Mogali-Ran-erand ; *Sk.* Akhuparnika, Kananerand, Sutashreni.

CHAR. :—A large deciduous soft-wooded shrub or small tree ; juice sticky opalescent ; *L.*—alternate, 10-15 × 7·5-12·5 cm., broadly ovate, cordate, palmately 3 or 5 lobed ; *Fl.*—monœcious, 7·5 mm.

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across, yellowish-green in loose axillary cymose panicles; male flowers, corolla lobes 5, villous within, longer than calyx; female corolla scarcely exceeding the calyx; *Fr.*—ovoid, black, breaking up into 3-valved cocci; *Sd.*—ovoid oblong, dull brownish-black, 1·8 cm. long.

DISTR. :—Native of tropical America.

OIL :—The seeds yield about 30% oil of pale-yellow colour and acrid taste; it is employed by the poorer classes for illuminating purposes. In England oil obtained from African seeds has a reputation as a lubricant and is said to be used in the manufacture of certain transparent soaps. It was also recommended as a substitute for olive oil in dressing woolen cloth and as a good drying oil. The chinese are said to form a varnish by boiling the oil with iron oxide.

*See*—Poisonous Plants, Fish Poisons.

### LAVANDULA BURMANNI Benth.

FAM.—Labiatæ.

COM. NS. :—M. Ghodeghui, Gorea.

CHAR. :—A slender erect aromatic herb; stem leafy, quadrangular. *L.*—very deeply pinnatisect, lobes linear. *Fl.*—dark-blue or white in dense spikes.

DISTR. :—Konkan, Deccan-Common; Chota Nagpur, W. Peninsula, Jabalpur.

OIL :—The plant on distillation is likely to yield a volatile oil which might be utilised in substitution for oils reecived from Europe.

The following Lavandula sp. are also likely to give a volatile oil on distillation.

### LAVANDULA GIBSONI Gærtn.

COM. NS. :—*M.* Nivale. Like the last, except that the plant is more hairy, leaf lobes broader and flowers pale lilac. The plant is found in Deccan hills.

### LAVANDULA STOECHAS Linn.

A shrub with dark purple flowers. A native of Mediterranean regions, has been grown in gardens in Belgaum and Dharwar, where it is said to have been introduced from the Cape of Good Hope. The dried plants and flowers are employed in native medicine and are largely imported into Bombay from the Persian Gulf

## LAWSONIA ALBA Lam.

FAM.—Lythraceæ.

COM. NS. :—*E.* Henna plant, Tree mignonette ; *G.* Medi, Mehndi ; *K.* Gorantha, Madaranga ; *M.* Mendi ; *Sk.* Medika, Nakharanjaka, Ragangi Yavaneshta.

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CHAR. :—A glabrous much branched shrub, lateral branches 4-gonous, often ending in spinous point ; *L.*—opposite, elliptic or broadly lanceolate, mucronate ; *Fl.*—in terminal, pyramidal and panicled cymes, many, fragrant, white or rose coloured ; *Fr.*—capsule, globose, veined outside, supported by persistent calyx ; *Sd.*—angular, truncate ; *Fl. t.*—Apl.-July.

DISTR. :—Coromandel coast and Madhya Bharat ; common on the sand-dungs near Tuticorin ; in the drier parts of the Indian Peninsula, Ceylon ; wild in Arabia, Iran and Baluchistan.

OIL :—The flowers are used in perfumery and a fragrant otto, Henna, is distilled from them in Benares, Lucknow and other localities. This otto is remarkably and delightfully fragrant. Fragrant distilled water from flowers was known to Jews and was employed in baths and as a perfume in religious ceremonies. Ancient Egyptians made a similar use of the flowers for perfuming oils and ointments.

*See*—Dyes and Tans.

## LEUCAS CEPHAOTES Spreng.

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FAM.—Labiatæ.

COM. NS. :—*G.* Kubi ; *H.* Dhurpisag ; *M.* Tumba.

CHAR. :—An annual hairy tall herb ; stems quadrangular. *L.*—ovate or lanceolate, serrate. *Fl.*—white in large, terminal globose whorls.

DISTR. :—Gujarat—Common ; Bengal, Punjab, Assam, Himalayas, W. Peninsula : Afghanistan.

OIL :—The seeds an oil used medicinally in Chota Nagpur and by the Manipuris as an adjunct in dyeing with Rubia.

## LINUM USITATISSIMUM Linn.

FAM.—Linaceæ.

COM. NS. :—*E.* Linseed ; *G.* Alshi : *H.* Alsi ; *K.* Alashi ; *M.* Javas.

DISTR. :—Extensively cultivated in the Deccan and S. M. country; The crop is a rabi crop and is mainly grown for oil.

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OIL :—The seeds yield about 40% oil. It may be extracted either cold or by heating the seeds to 200° F and then crushing them. It contains a high percentage of phosphorus and potash. It burns for quite a long time and is a good, drying oil, being therefore in amongst painters. It is extensively used in paints, varnishes, linoleum manufacuture and printer's ink. It is used by sportsmen for oiling wooden sport requisits. It is also used medicinally.

The oil-cake is very useful for fattening cattle and used also as a good manure.

*See*—Medicinal Plants.

## LUFFA ACUTANGULA *Var.* AMARA Clarke.

FAM.—Cucurbiteceæ.

COM. NS. :—*E.* Ridge gourd ; *G.* Kadvi-turai or ghiosdi ; *H.* Jhinga, Karvituri ; *K.* Kahire ; *M.* Divali, Kadudodka, Ranturai ; *Sk.* Ghontali, Katukoshataki, Jalini.

CHAR. :—A large climber, stem 5-angled, tendrils usually 3-fid ; *L.*—small, at first whitish and softly violous, at length scabrid, pale-green, palmate, 5-7 lobed, base cordate ; *Fl.*—monœcious ; males in axillary 12-20 flowered racemes ; *C.*—petals yellow with green veins ; females solitary in the same axil as males ; *Fr.*—obovoid, obtusely conical at both ends, 5-10 cm. long and about 2·5-3·8 cm. thick ; 10 ribbed, bitter ; *Fl. t.*—Sept.

DISTR. :—Throughout India, especially in Western Peninsula ; Ceylon.

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OIL :—The seeds yield an oil.

*See*—Fibres.

## LUFFA ÆGYPTIACA Mill.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Sponge-gourd ; *G.* Turia ; *K.* Tiprikayi ; *M.* Ghosale.

CHAR. :—Like the preceding except that the fruit is cylindric or somewhat trigonous, blunt at the end, marked with longitudinal lines.

DISTR. :—Extensively cultivated in gardens and fields.

OIL :—An oil is obtained from the seeds similar to that from other cucurbitous plants.

*See*—Fibres, Vegetables.

**SECTION 2.**

**Oil Plants.**

## MADHUKA INDICA Gmel.

## (BASSIA LATIFOLIA Roxb.)

FAM.—Sapotaceæ.

COM. NS. :—*E.* Honey Tree, Madhuva of S. India; *G.* Mahuda, Movonujhad; *H.* Moha, Mohua; *K.* Ippe, Huli, Movaro; *M.* Mohachejhad, Mohwa.

CHAR. :—A large evergreen tree, 12-15 m. high; girth 1·2-1·8 m. *Bark* dark yellowish-grey, thick, slightly furrowed, scaly; inner bark red, milky. Young shoots villous. *L.*—10-18 × 2·5-4 cm., clustered near the ends of the branches, lanceolate, narrow at both ends, entire, smooth on villous petioles 2·5-4 cm., stipules villous, caducous, ensiform. *Fl.*—crowded near the ends of branches, pedicels 5-7·5 cm., sub-erect, one-flowered. Calyx segments 4, acute. Corolla tube equal to length of calyx, limb 8-10 cleft. Anthers 16-20 in two series. *Fr.*—berry, oblong, size of a plum yellowish when ripe. *Fl. t.*—Apr.-May. *Fr. t.*—Aug.-Sept.

DISTR. :—Common in the dry forests and along the rivers and nalas in the State; common in the Konkan and N. Kanara but nowhere abundant. Western Peninsula, Mysore, Karnatak. Ceylon, upper Burma. Often planted.

OIL :—The fruit kernels yield a yellowish-green oil on extraction. It is eaten by the tribes in Madhya Bharat and is used for adulterating ghee. It is largely used for burning by the Bhils and other hill-tribes in Madhya Pradesh. It is a useful oil for soap-making; in Gujarat. Mohamedans used to manufacture soap from this oil.

*See*—Medicinal Plants, Gums and Resins, Dyes and Tans, Fodder Plants.

## MADHUKA LONGIFOLIA Mecbr.

## (BASSIA LONGIFOLIA Linn.)

FAM.—Sapotaceæ.

COM. NS. :—*E.* Butter Tree, Mahua Tree; *G.* Mahuda, Mahura; *H.* Mahua, Mahula, Mowa; *K.* Doddippa, Hunnage Ippi, Pokka; *M.* Moha, Mhowra, Mowda.

CHAR. :—A large deciduous tree, 12-15 m. high, girth 1·8-2·1 m. *Bark* 1·3 cm. thick, grey with vertical cracks, exfoliating in thin scales; inner bark red, milky. Young parts, petiole and pedicels pubescent or tawny-tomentose. *L.*—10-20 × 5-7 cm., elliptic or oblong-elliptic, short-acuminate, coriaceous, congested near the ends of branches;

eptiole round, 2·5-4 cm., stipules subulate, downy. *Fl.*—white, or yellowish-white, numerous, fleshy, crowded from the extremity of the branches, drooping on pedicles 2·5-4 cm. Calyx 4-5-sepalled, coriaceous, densely rusty-tomentose. Corolla-tube ovoid, limb of 7-14 parts, stamens 20-80 in three series. *Fr.*—fleshy, ovoid, 2·5-5 cm., 1-4-seeded, very rarely more. *Fl. t.*—Mar.-Apr. *Fr. t.*—June-July. Leafless—Feb.-Apr.; new leaves appear soon after.

DISTR. :—Deciduous forests; prefer dry sandy and rocky soils; thrives on Deccan trap. Common in the deciduous forests, throughout the State; also in Konkan and N. Kanara; often cultivated and self-sown near villages; forests of Madhya Bharat, Madhya Pradesh, Western Bengal, Kumaon Tarai, Burma.

OIL :—Like the preceding species.

*See*—Medicinal Plants, Gums and Resins.

## MALLOTUS PHILIPPINENSIS Muell.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Monkey-face tree; *G.* Kapilo; *H.* Kamala, Kambhal, Raini; *K.* Mullichillu, Kapila, Kesarimavu; *M.* Shendri, *Sk.* Kapila, Kampillaka.

CHAR. :—A small evergreen tree, 7·5-9 m. high, girth ·9-·12 m. *Bark* ·6 m. thick, grey, inner substance red, marked by irregular cracks. Branchlets, inflorescence and under surface of leaves hoary. *L.*—7·5-15 × 3·1-7·5 cm., alternate, ovate or ovate-lanceolate, acuminate or obtuse, glabrous, with minute red glands beneath, and 2 depressed glands at the base above, entire or sometimes slightly toothed; petioles 5-7·5 cm. *Fl.*—white and yellow, small, sessile or subsessile, in axillary and terminal paniculate spikes; calyx furnished with red glands; stamens about 26. Ovary tomentose, 3-celled; styles 3, thickly plumose. *Fr.*—capsule, ·9-1·3 diam., 3-lobed, 3-celled, 3-valved, covered with a red powder consisting of *Kesin* mixed with minute stellate hairs (Brandis). *Fl. t.*—Nov.-Jan. *Fr. t.*—Feb.-May.

DISTR. :—Throughout the State in dry and open thorn forests; more common in the Konkan jungles and hills; also in the Deccan and Gujarat. Throughout Tropical India; Sind, Ceylon, Malay Islands, China and Australia.

OIL :—The seeds yield a bland oil used medicinally.

*See*—Medicinal Plants, Dyes and Tans, Fodder Plants.

## MARTYNIA DIANDRA Glox.

FAM.—Pedaliaceæ.

SECTION 2.

Oil Plants.

COM. NS. :—*E.* Tiger or Devil's claw ; *H.* Bichu ; *M.* Vinchui.

CHAR. :—A small plant. *L.*—large, cordate, glutinous. *Fl.* handsome, rose coloured, ill-smelling. *Fr.*—very hard, beetle-shaped, with two sharp axterior hooks.

DISTR. :—Growing in rubbish heaps and waste places all over ; a native of Mexico becoming naturalised.

OIL :—The Rev. A. Campbell states that Santals distill a medicinal oil from the fruit ; he does not mention the purpose for which the oil is used.

## MELIA AZEDARACH Linn.

FAM.—Meliaceæ.

COM. NS. :—*E.* Bastard-cedar, Bead tree, Persian Lilac ; *G.* Bakan Limbado ; *H.* Bakain, Betain, Diekna, Drek ; *K.* Bevu, Chickbevu, Heb-bevu ; *M.* Padrai, Pejri.

CHAR. :—A deciduous tree, 12-15 m. high, girth 1·8-·1 m. *Bark* grey or greyish-brown, with long shallow vertical fissures. Young parts and inflorescence minutely puberulous. *L.*—23·4-48·8 cm. long, bipinnate, occasionally tripinnate, with or without an odd one, opposite, sub-opposite or alternate. *L.*—4-7·8 × 1·34-3·2 cm., ovate or lanceolate, unequal, acuminate at the apex and more or less oblique at the base, serrate or entire at the upper end, very shortly petioluled. *Fl.*—usually 5-merous, pale lilac, small, honey-scented, on short, slender pedicels, in solitary, more or less puberulous axillary panicles, shorter than the leaves. *Calyx* deeply cleft, lobes oblong-lanceolate. Petals puberulous. Staminal tube purple, glabrous outside, many-toothed at the tip. Ovary 5-celled. Stigma 5-furrowed. *Fr.*—drupe, sub-globose, yellow when ripe, with 5 or fewer cells and seeds. *Fl.* t.—Feb.-Mar., sometimes throughout the year. *Fr. t.*—Mar.-Apr. Sheds leaves Feb.-Apr. ; new leaves end of hot season.

DISTR. :—Commonly cultivated throughout India. Indigenous in the Jhelum valley in Kashmir. Said to grow wild in sub-Himalayan tract ; also wild in Baluchistan, Burma and Indian Archipelago.

OIL :—A fixed oil is extracted from the seeds similar to that of neem.

*See*—Sacred Plants.

## MENTHA ARVENSIS Linn.

FAM.—Labiatæ.

SECTION 2.
Oil Plants.

COM. NS. :—*E.* Corn-March mint ; *G.* Pudina ; *H.* Pudinah ; *K.* Chatinmaragu ; *M.* Pudina.

CHAR. :—A perennial erect herb ; stem, short, hairy ; *L.*—narrowed below, stalked, ovate, oblong, lanceolate, toothed ; the upper similar and large ; *Fl.*—in axillary distant whorls, none at the top ; *C.*—subequally 4-lobed, lilac, lined with hairs and hairy outside ; *Fr.*—nutlets dry, smooth.

DISTR. :—Western Himalayas, Kashmir, Europe, North and West Asia, China.

OIL :—The herb yields an essential oil similar to that of Peppermint (*Mentha piperita* L.) but inferior to it in aroma and quality.

*See*—Condiments and Spices.

## MENTHA PIPERITA Linn.

FAM.—Labiaæ.

COM. NS. :—*E.* Peppermint.

CHAR. :—Aromatic herb with reddish branched stem. *L.*—ovate-oblong. *Fl.*—purple in short loose spikes.

DISTR. :—Grown in gardens in the State.

OIL :—The herb yields a volatile strongly aromatic oil. It is obtained by sun-drying cuttings of the plant—which increases the yield by 7% and thereafter distilling them. It is largely used in medicine and also used as a flavouring and perfumery agent. The oil consits of two substances—one fluid and the other solid. When the oil is cooled, deposits of colourless and hexagonal crystals are formed which are called menthol or peppermint camphor.

*See*—Condiments and Spices.

## MENTHA VIRIDS Linn.

FAM.—Labiatæ.

COM. NS. :—*E.* Green Mint, Spear Mint ; *M.* Pudina.

CHAR. :—A herb. *L.*—aromatic, ovate-lanceolate, serrate. *Fl.*—purplish.

DISTR. :—Commonly grown in gardens in the State and throughout the plains of India.

OIL :—The plant yields an essential oil used medicinally and as flavouring agent by perfumers and soap-makers.

*See*—Condiments and Spices.

## MESUA FERREA Linn.

FAM.—Guttifereæ.

**SECTION 2.**

**Oil Plants.**

COM. NS. :—*E.* Assam or Ceylon Iron Wood; *H.* Naghas, Nagkesara; *K.* Nag Kesar, Nagsampige; *M.* Nag-champa; *Tr.* Mesua.

CHAR. :—A large evergreen glabrous tree, 15-18 m. high with a girth of about 1·8-2·1 m. Trunk straight, branches slender, obsolutely 4-angled. *Bark* ·67 cm. thick, reddish brown, peeling off in flat, thin flakes, having a slightly roughened surface. *L.*—very variable in size, usually 7·8-15·6 × 4-4·8 cm., linear-lanceolate or oblong-lanceolate, acute or acuminate at the apex, acute or rounded at the base. rigidly coriaceous, glabrous, dark-green and shining above, covered more or less with fine white tomentum or glaucous beneath; veins very fine, numerous, close-set, inconspicuous. *Fl.*—large, 2-2·8 cm. in diam., pure white, fragrant (the fragrance partaking of rose and violet), usually terminal, and solitary or in pairs. Sepals 4, rotundate, fleshy, velvety with membranous margins, inner pair largest. Petals 4, spreading broadly obovate, Stamens numerous, free or connate at the base. Anthers large, golden-yellow, 2-celled, dehiscing vartically. Ovary 2-celled. Style long, with a peltate stigma. *Fr.*—drupe, of a variable size, often the size of a pigeon's egg, ovate, acuminate, striate, the base surrounded by the persistent sepals. Seeds 1, rarely 2-4, dark-brown, smooth. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-June. A very variable species as regards the size of the flowers, width of the leaves, and the amount of white mealy covering underneath and quality of wood.

DISTR. :—Throughout the evergreen rain-forests of N. Kanara and S. Kanara, S. Konkan, Mountains of E. Bengal, E. Himalayas, E. and W. Peninsulas, and the Andamans; Ceylon often cultivated on accounts of its flowers. Isolated trees are occasionally found in bloom in the tropical evergreen forests and covered with a mass of scented white and yellow flowers, looking like pyramids and surrounded by myriads of winged insects.

OIL :—The seeds yield a thick dark coloured oil used for burning in lamps and as an external application. The seeds are so oily that they are used as such in certain localities instead of a lamp, for when merely shelled and dried, they burn with a bright flame.

*See*—Medicinal Plants, Gums and Resins.

## MICHELIA CHAMPACA Linn.

FAM.—Magnoliaceæ.

COM. NS. :—*E.* Golden Champo; *G.* Champo, Rac Champo; *H.* Champa; *K.* Champige, Sampige; *M.* Sonechapha; *Tr.* champ.

**SECTION 2.**

**Oil Plants.**

CHAR. :—A large evergreen tree, 9-18 m. high (in favourable places up to 30 m.). *Bark* grey, smooth, 1·3 cm. thick. *L.*—ovate, pointed, wavy, 20-26 cm. long, nearly glabrous when full grown. *Fl.*—strongly scented, yellow or orange, shortly pedunculate about 5·2 cm. across. Perianth leaves 15-20. *Fr.*—spike, compact 7·8-15·6 cm. long. Carpels ovoid, blunt, lenticulate. Seeds brown. *Fl. t.*—all the year round, but chefly in May.

DITR. :—Cultivated all over the State; wild in the Western Ghats. Cultivated in the moister parts of India and Burma. Wild in Nepal, Sikkim, Eastern Himalayas, Assam, Burma and the Southern parts of the Peninsula.

OIL :—The seeds are said to yield a fatty oil. The flowers yield a volatile oil and the leaves when distilled produce a sweetly scented water.

*See*—Dyes and Tans.

### MICROMERIA CAPITATA Benth.

FAM.—Labiatæ.

COM. NS. :—*M.* Karvat.

CHAR. :—A highly aromatic herb; stems purplish, quadrangular, hairy. *L.*—ovate, pubescent, gland-dotted. *Fl.*—in verticillate cymes in axils of floral leaves; corolla 2 lipped, upper lip whitish, lower darker violet.

DISTR. :—Common at Mahabaleshwar; W. Himalayas, Bihar, W. Peninsula.

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OIL :—The plant possesses all the aromatic properties of peppermint and, if distilled, is likely to give a useful volatile oil.

### MIMUSOPS ELENGI Linn.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Baphuli, Borsalli, Vareuli; *H.* Bakul, Bolsari, Mulsari; *K.* Bakul, Kalhale, Mugule, Manjale; *M.* Bakul, Vavali.

CHAR. :—A large glabrous evergreen tree, 12-15 m. high; girth 1·2-2·1 m., head compact, leafy; trunk erect. *Bark* grey, rough, deeply cracked with vertical and transverse fissures; young shoots and pedicels shortly rusty-pubescent. *L.*—7·5-10 × 2·5-4 cm. entire, smooth, coriaceous, shining, glabrous, elliptic-oblong, acuminate, on a petiole 1·3-2 cm. *Fl.*—white, very fragrant, about 1·5 cm. diam., in axillary fascicles of 2-8 on drooping tawny pedicels 4-6 lin. Calyx segments 8. Corolla lobes three times as many as sepals; the outer series consists of 16 (occasionally 12), the inner of 8 (occasionally 6) lobes. Stamens 8. *Fr.*—berry, about 1·3-2·5 cm., yellow when ripe, smooth edible, 1-seeded by abortion. *Fl. t.*—Jan.-Apr. *Fr. t.*—about the end of rains.

DISTR. :—Evergreen forests; common in the rain-forests of Noth Kanara and the Konkan; often planted in gardens; Western Peninsula; Ceylon, Malaya; cultivated in the tropics.

OIL :—The flowers contain a volatile oil from which a sweet scented water is distilled, and an *attar* prepared. From the seeds a fixed oil is obtained by expression, which is used for culinary purposes, for burning and medicinally.

*See*—Medicinal Plants, Fruit Trees, Gums and Resins, Dyes and Tans.

## MANILKANA HEXANDRA Roxb.

## (MIMUSOPS HEXANDRA, Rox*b*.)

FAM.—Sapotaceæ.

COM. NS. :—*G.* Rayan; *H.* Khir, Khirni; *M.* Khirni, Raini, Ranjana.

CHAR. :—A large evergreen ornamental, glabrous tree, 15-18 m. high, girth 3·6-4·5 m. Head shady, trunk erect without branches for a considerable height. *Bark* blackish-grey, deeply furrowed. L.—5-10 ×4-5 cm., obovate-oblong, notched at the end, narrowed at the base, sometimes crowded at the end of the branches, glabrous, shining above; petiole 1·3-2·5 cm. *Fl.*—white and yellow, not fragrant, ·6 cm. diam., on solitary, axillary pedicels. Calyx segments 6. Corolla lobes two series, the outer consisting of 12 white and the inner of 6 yellow lobes. Stamens 12. *Fr.*—about 2·5 cm. diam., yellow when ripe, smooth, usually 1-seeded by abortion. Seed compressed, oblong, about 1·3 cm. *Fl. t.*—Oct.-Dec. *Fr. t.*—ripe in Mar.

DISTR. :—Common in the dry forests of the Deccan, Khandesh and Gujarat, S. M. Country (Belgaum); Western Peninsula, cultivated in N. W. India : Ceylon.

OIL :—The seeds are said to yield an oil. It is used in Baroda to adulterate gree.

*See*—Fruit Trees, Fodder Plant

## MIMUSOPS KAUKI Linn.

FAM.—Sapotaceæ.

**SECTION 2.**
**Oil Plants.**

COM. NS. :—*E.* Obtuse-leaved Minusops, Adam's Apple tree; *H.* Khirni; *M.* Kauki, Khirni.

CHAR. :—A beautiful evergreen tree, 9-12 m. high; girth ·9-1·2 cm. Branches numerous, round, spreading horizontally. *L.*—6·3-10 cm., clustered at the ends of the branches, elliptic-ovate or obovate, obtuse or retuse, entire, coriaceous, drak-green, shining above, white or ash-white beneath, nerves parallel, prominent beneath. *Fl.*—white with a purple tings, small on solitary, axillary, recurved pedicels about as long as the petiole. Calyx divisions 6 in two series, slightly downy. Corolla lobes in two series 12 outer, 6 inner. *Fr.*—berry, oval or obovate, purple when ripe, crowned with persistent style, 1-seeded by abortion, 2·5-4 cm. long. Seed triangular, compressed, of a light purplish colour. *Fl. t.*—Aug.-Sept.; fruit remaining on the tree for a long time.

DISTR. :—Rarely cultivated in the Bombay State; also cultivated in Malabar, Cochin and Bengal. Native of Eastern Archipelago and Australia.

OIL :—An oil is said to be expressed in Burma from the seeds.

## MORINGA OLEIFERA Lam.

## (MORINGA PTERYGOSPERMA Gærtn.)

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FAM.—Moringaceæ.

COM. NS. :—*E.* Drum-stick tree, Indian horse-radish; *G.* Sargavo, Seglo; *H.* Ganjna, Senjana, Senja; *K.* Kochka, Nuggi; *M.* Shevga, Shekat.

CHAR. :—A tree 4·5-7·5 m. high, girth 1·2-1·5 m. *Bark* 2·5 cm. thick, grey, corky, with longitudinal cracks. Young parts tomentose. *L.*—·3-·6 m. long, alternate, twice or usually thrice pinnate; petiole sheathing at the base; pinnæ 4-6 pairs. Pinnules 6-9 pairs, opposite, elliptic, ovate, or obovate on slender petiolules; glands between each pair of pinnæ. *Fl.*—2·5 cm. diam., white, honey-scented, arranged in panicles spreading at the ends of branches. Sepals linear-lanceolate, Petals linear-spathulate. Fertile filaments hairy at the base. Ovary villous. *Fr.*—pod, 23-46 cm., pendulous, with 9 longitudinal ribs. Seeds 3-gonous, winged at the angles. *Fl. t.*—Jan.-Apr. *Fr. t.*—Apr., onwards. Sheds leaves Dec.-Jan. New leaves—Mar.-Apr.

DISTR. :—Wild in sub-Himalayan tract from the Chenab to the Sarada ; also in Cutch forests. Cultivated in fields and gardens all over the State, and throughout India ; Burma and Ceylon.

OIL :—The seeds yield a clear, limpid, almost colourless oil, rather thick, easily extracted by simple process. It is commercially termed *Ben-oil* and is highly valued as a lubricant by watch-makers. It is, however, seldom made in India, and does not form an article of export, a fact which is the more remarkable when one finds the great extent to which the tree is grown in India. India might easily supply the whole world with Ben-oil and it is hoped that attention may be directed to the subject. It is highly esteemed by perfumers owing to its great power of absorbing and retaining even the most fugitive odours.

*See*—Medicinal Plants, Gums and Resins, Vegetables, Fibres.

## MURRAYA KOENIGI Spreng.

FAM.—Rutaceæ.

COM. NS. :—*E.* Currey-leaf tree ; *H.* Harri, Gandhla, Katnim ; *K.* Kuri-bevu ; *M.* Kadhi-nimb, Kudia-nimb, Poospala.

CHAR. :—A small unarmed, evergreen tree, 4·5-6 m. high, girth ·45-·6 m. *Bark* grey with shallow netted fissures. *L.*—about ·3 cm. long ; 11-21 foliolate, pubescent or glabrous. Petiole slender, round, pubescent, not winged. Leaflets 2·6-4 cm., shortly petioluled, alternate, ovate-lanceolate, obtusely acuminate, slightly emarginate, usually oblique at the base, crenulate. *Fl.*—white, fragrant, small, ebracteate, in dense terminal corymbiform panicles. Sepals 5, acute, persistent. Petals 5, oblong-lanceolate, acute or abtuse, about 2-4 lin. long, dotted. Stamens 10, alternately longer. Filaments dilated below, and inserted around the elongated disc. Anthers small. Ovary 2-celled. Style short, thick, stigma capitate. *Fr.*—berry, ovoid or sub-globose, size of a small pea. 1-2 seeded, bluish-black, rugose. Seeds imbedded in mucilage. *Fl. t.*—hot season. *Fr. t.*—June onwards.

DISTR. :—Common in the moist evergreen forests of the Konkan and N. Kanara ; forms a large proportion of the undergrowth in some of the highe timber deciduous forests of the Supa Sub-Division in N. Kanara. Found wild at Mahabaleshwar and Matheran. Malabar, Travancore, Madras, Bengal, foot of the Himalayas from Garhwal to Sikkim. Pegu, Ceylon. Often cultivated.

OIL :—The leaves contain a strongly odoriferous oil.

*See*—Condiments and Spices.

## MYRISTICA MALABARICA Lamk.

FAM.—Myristicaceæ.

COM. NS. :—*E.* False Nutmeg ; *K.* Kanagi, Rampatri ; *M.* Jangali or Ran Jaiphal, Kaiphal.

CHAR. :—A large, elegant, evergreen tree. *Bark* smooth, with small lenticular spots ; the inner bark with much red juice. *L.*—10-20 × 4-6·8 cm., narrow, oblong or elliptic, lanceolate, acute or obtuse at the apex, acute or rounded at the base glabrous on both sides, dull-coloured above, dull-brown or whitish beneath, petiole channelled above. *Male fl.*—more numerous and smaller than female ones on axillary cymes, 2·5-7·5 cm., perianth sub-globose, 3-4-cleft at the apex. Anthers 10-15, covering more than three-fourths of the column. *Female* peduncles axillary, usually simple, bearing 3-6 flowers. *Fr.*—6·8-7·5 × 1·3-2·6 cm. oblong. Aril orange-red, lobes twisted and folded into a cone at the top. *Fl. t.*—Nov.-Mar. *Fr. t.*—cold and hot season. Fruit remaining for a long time on the tree.

DISTR. :—In the evergreen forests of the Konkan and the North Kanara ghats. Common in the Mukta taluka forests, Malabar.

OIL :—The seeds when bruised and subjected to boiling, yield a quantity of yellowish concrete oil, which is used medicinally and for purposes of illumination.

*See*—Medicinal Plants, Condiments and Spices.

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## MYRTUS COMMUNIS Linn.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Myrtle ; *H.* Habules, Murad, Vilayantimendhi ; *M.* Malati.

CHAR. :—A shrub ; *L.*—small, ovate to lanceolate, very sweet smelling ; *Fl.*—solitary, axillary on slender peduncles, small, white ; *Fr.*—berry, ellipsoid, black when ripe.

DISTR. :—Often grown in gardens throughout India ; indigenous from the Mediterranean to N. W. Himalayas.

OIL :—A fixed oil is said to be obtained from the berries and is believed to strengthen and promote the growth of hair. An essential oil is distilled from leaves and flowers. It is yellowish and greenish-yellow in colour and highly fragrant. It is largely employed in perfumery in Europe. This oil is used medicinally.

## NICOTIANA TABACUM Linn.

FAM.—Solanacete.

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—
**Oil Plants.**

COM. NS. :—*E.* Tobacco; *G.* Tabak, Tamaku; *H.* Bujjarbhang, Tambak; *K.* Hoge soppu; *M.* Tambakhu; *Sk.* Dhumrapatrika, Kalanja, Krimighni, Tamakhu, Tamarakuthika.

CHAR. :—An erect glandular-pubescent herb with terete stem; *L.*—alternate, large (especially lower ones), oblong or elliptic, sessile or shortly stalked (upper ones become smaller), base wedge-shaped; they differ greatly according to the variety from narrowly linear-lanceolate to broadly oblong, the surface is plain or bullate; *Fl.*—in open corymbose panicles; *C.*—pink or white, about 1·8 cm. across, funnel-shaped, lobes spreading. *Fr.*—capsule, conical.

DISTR. :—Native of America; cultivated in all tropical countries.

OIL :—When distilled at a temperature above that of boiling water, tobacco affords an oil. It is of a dark-brown colour, with acrid taste and very disagreeable odour. It is a most virulent poison.

The seeds are said to yield on pressure 35 to 37 %, greenish-yellow, mild, inodorous oil. It is found to be free from nicotine and can be used as an edible oil. It resembles very much *til* or *gingely* oil.

## NYCTANTHES ARBOR-TRISTIS Linn.

FAM.—Oleaceæ.

COM. NS. :—*E.* Coral-Night-flowering Jasmine; Indian Mourner; *G.* Jayaparvati; *H.* Har, Har-singhar, Sephali; *K.* Harsing, Parijata, *M.* Parijataka, Prajakta; *Sk.* Kharapatraka, Nalkumkuma, Parijata, Prajakta, Sephalika.

CHAR. :—A large shrub or a small tree, rough all over with stiff whitish hairs; young branches quadrangular, hairy; *L.*—opposite 5-10 × 2·5-6·3 cm., ovate acute, rough above with bulbous hairs, densely pubescent beneath; *Fl.*—fragrant, in pedunculate bractetate fascicles of 3-5; peduncles 4-angled, axillary, solitary, in terminal trichotomous cymes; *C.*—lobes white, tube orange-coloured; *Fr.*—capsule, obcordate or merely orbicular, compressed, 2-celled, separating in to 2-flat, 1-seeded carpels; *Fl. t.*—more or less throughout the year; abundant July-Sept.

DISTR. :—Outer Himalayan ranges from the Chenab to Nepal, Assam, Burma, Bengal, Madhya Bharat, southwards to the Godavari. Cultivated in many parts of India.

OIL :—The fragrant flowers of the plant contain an essential oil similar to that of Jasmine.

*See*—Dyes and Tans, Sacred Plants.

## OCIMUM BASILICUM Linn.

FAM.—Labiateæ.

COM. NS. :—*E*. Common sweet basil ; *G*. Damaro, Nasabo ; Sabja ; *H*. Bahari, Barbar, Rihan, Sabzah ; *K*. Ramkasturi, Sajjebija ; *M*. Sabja, Tukhamariya ; *Sk*. Ajagandhika, Barbar, Surabhi, Surasa, Tungi, Manjarki.

CHAR. :—An rect herb 0·6-0·9 m. high, glabrous or hispidly pubescent ; stems and branches green or purplish ; *L*.—ovate-acute, entire, toothed or lobed ; *Fl*.—in whorled racemes ; terminal raceme longer than the lateral ; bracts stalked ; *C*.—2-lipped, 8-13 mm. long white, pink or purplish, glabrous or pubescent. *Fr*.—untlets about 2 mm. long, ellipsoid, black and pitted.

*Var*.—thyrsiflora, purple stem, pink flowers in thyrsoid racemes.

DISTR. :—Indigenous on the lower hills of the Punjab. Cultivated throughout the greater part of India, Ceylon, Burma.

OIL :—On distillation the plant yields a yellowish-green volatile oil lighter than water, which on being kept solidifies into a crystalline camphor, isomeric with turpentine camphor.

*See*—Fibres.

## OSMANTHUS FRAGRANS Lour.

### (OLEA FRAGRANS Thunb.)

FAM.—Oleaceæ.

CHAR. :—A shrub. *L*.—fairly large, coriaceous, glaucous. *Fl*.—small, white, delightfully fragrant. Flowers abundantly during the cold season.

DISTR. :—Largely grown in the gardens in the Bombay State. A native of China and Japan.

OIL :—The flowers which contain a volatile oil are used in China to flavour tea.

SECTION 2.
Oil Plants.

## PANDANUS ODORATTISSIMUS Linn.

FAM.—Pandanaceæ.

COM. NS. :—*E*. Screw pine, Umbrella Tree ; *G*. Kewoda ; *H*. Gogandhul, Keora,Ketgi ; *K*. Kedige, Ketaki, Mundige ; *M*. Kevada ; *Sk*. Chama-pushpa, Gandha-pushpa, Ketaka, Giripriya, Dhulipushpika.

CHAR. :—A shrub up to 6 m. high, rarely erect ; stem supported by ærial roots ; *L*.—glaucous green, 0·9-1·5 m. long, coriaceous ensiform, margins and midrib spiny ; *Fl*.—diœcious *male-flower* spadix with many cylindric spikes enclosed in long white or yellow fragrant spathes ; *female-flowers* spadix solitary ; *Fr*.—oblong or globose, yellow or red ; drupes 50-80 each consisting of 5 to 12 carpels.

DISTR. :—Sea-coast of Indian Peninsula on both sides, Sundarban, Burma, Andamans ; often planted.

OIL :—The oil called *Kevara-oil* is obtained by distillation from the fragrant bracts. The perfume is chiefly extracted from the *male-flower bracts*. An aromatic water is also distilled from the bracts. Both are used medicinally. A medicinal oil is also prepared from the roots.

*See*—Fibres, Sacred Plants.

## PITHECOLOBIUM DULCE Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E*. Manilla tamarind ; *H*. Dakhani-babul, Vilayati Imli ; *M*. Vilayati Chinch.

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CHAR :—A moderately large evergreen tree, 6·9 m. high, girth 1·2-1·5 m., armed with short straight stipular thorns. *Bark* smooth, lenticellate, with horizontal raised ridges, often crowded with woody prickles. *L*.—pinnæ and leaflets 2. Leaflets unequal-sided, 2·5-5 cm., oblique. obovate-oblong, rigidly sub-coriaceous, obtuse, glaucescent. *Fl*.—white, sessile in small heads, 1·3 cm. broad, on long terminal, racemose panicles. Calyx a line long. *Fr*.—pod, 10-13 × 1·3 cm., fleshy, coriaceous, twisted. Seeds 6-8, dark-brown, imbedded in a white, firm, sweet, edible pulp. *Fl. t*.—Jan.-Mar. *Fr. t*.—ripe Apr.-June.

DISTR. :—A native of Mexico, introduced into India ; is cultivated often as a hedge plant ; is met with as hedge in the State in many places, specially in Bombay and Poona.

OIL :—The seeds yield a fatty light coloured oil, as thick as castor oil.

*See*—Gums and Resins, Fodder Plants.

### POGOSTOMON PARVIFLORUS Benth.

FAM.—Labiateæ.

SECTION 2.

Oil Plants.

COM. NS. :—*M.* Pangli, Phangla.

CHAR. :—A small shrub 1·2-1·8 m. high; stems and branches quadrangular, purple, smooth, shining; *L.*—with a strong odour of black currants when bruised, 7·5-18 × 3·8-9 cm., broadly ovate, irregularly doubly toothed; *Fl.*—in dense pubescent spikes forming pyramidal lax panicles, whorls close, many flowered; *C.*—2-lipped, 4-lobed; upper lip white shot with purple, 3-lobed, lower lip white, entire; *Fr.*—nutless ellipsoid, inner face angular, rounded, shining black; *Fl. t.*—Dec.-Feb.

DISTR. :—More or less throughout India.

OIL :—The leaves yield an essential oil on distillation.

### POGOSTEMON PATCHOULY Pellet.

FAM.—Labiateæ.

COM. NS. :—*E.* The Patchouly Plant; *M.* Pach.

CHAR. :—A herbaceous aromatic shrub; much resembling the preceding species from which it is distinguished by its peculiar odour.

DISTR. :—Grown in gardens, and sometimes found as an escape, in the State.

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OIL :—The plant yields a volatile oil by distillation. Odour is said to be the most powerful than of any volatile oil; accordingly a very small quantity is sufficient to impart a powerful and permanent odour to a large quantity of essence prepared from it. The essence is popular in India as well as in parts of Europe as a scent and used in the blending of perfumes. The plant is worth cultivation on a large scale.

### POLIANTHES TUBEROSA Linn.

FAM.—Amaryllidaceæ.

COM. NS. :—*E.* Tuberose; *H.* Gulshabu; *M.* Gulchhadi, Gulchhabu.

CHAR. :—A tuberous herbaceous plant. *L.*—linear, radial or on the lower part of the stem. *Fl.*—tubular, white, very fragrant on terminal simple raceme.

DISTR. :—Largely cultivated in gardens in the State and more or less throughout India. A native of Mexico. S. Europe.

OIL :—Flowers of this plant yield attar of tuberose. One of the most exquisite of perfumes is obtained from the flowers by enfleurage, that is, by extracting the odorous principle with oil water; From the pomatum thus manufactured, an extract is prepared with rectified spirit. The essence is exceedingly volatile.

## PONGAMIA PINNATA Pierre.

## (PONGAMIA GLABRA Vent)

FAM.—Papilionaceæ.

COM. NS. :—*E.* Indian Beech; *G.* Kanaji, Karanji; *H.* Kanja Karang, Kirmal; *K.* Honge, Huligalli, Karani-maru; *M.* Karanja.

CHAR. :—A tall almost evergreen tree, with short white or dark cinereous trunk, 15-18 m. high; girth 1·5-2·4 m. *Bark* soft, grey, covered with tubercles. Leaflets 5-7, opposite, oblong or ovate, acute 5-12·5 cm. long. *Fl.*—mixed white, blue or purple in peduncled axillary racemes; pedicles with a pair of bracteoles in the middle. Calyx nearly truncate. Corolla much exserted, 1·3 cm. in dim., standard broad, keel obtuse, petals united. *Fr.*—legume, thick, woody, 5 cm. long, 1-2, seeded. *Fr. t.*—Apr. of the following year.

DISTR. :—Planted and wild. Throughout the State in moist situations along rivers and *nalas* (Deccan). Often planted as a roadside tree. Very common near the sea-coast (Konkan). From the Himalayas to Ceylon and Malacca.

OIL :—The seeds yield a red-brown thick oil used for illuminating and for medicinal purposes.

The oil-cake is used as manure and a remedy against white ants in the fields.

*See*—Medicinal Plants, Fibres.

## PRUNUS PERSICA (Sieb & Zucc).

FAM.—Rosaceæ.

COM. NS. :—*E.* Peach; *H.* Aru; *M.* Saptalu.

CHAR. :—A small tree. *L.*—broad, lancedate, coarsely serrate, petiole gland-bearing. *Fl.*—solitary, pink. *Fr.*—Size of a chikku fruit, soft, pubescent at maturity; stone, deep-pitted, very hard.

DISTR. :—Cultivated on a small scale at Deolali near Nasik and at Panchgani near Mahabaleshwar. Cultivated on large scale in N. W. Provinces, Punjab and the region at the foot of the Himalayas; a native of China, grown in England, America, Iraq, Iran, Australia.

OIL :—An oil is obtained from the kernels, resembling that of bitter almonds, for which it may be substituted. It is used by the Natives of Himalayas and Kashmir for cooking, for illuminating purposes and for dressing hair.

*See*—Fruit Trees.

### PSORALEA CORYLIFOLIA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Babachi; *G.* Bowach-chi; *H.* Babachi, Bhavanj, Bukchi; *K.* Bavachi; *M.* Bavachi; *Sk.* Bakuchi, Chandralekha, Kalameshi, Kushtaghni, Vanguji.

CHAR. :—An erect annual, 0·6-1·2 m. high; stem and branches grooved; studded with glands and white hairs; *L.*—simple; 3·8 × 2·5-5 cm., broadly elliptic inciso-dentate, rounded and mucroniate at the apex, white hairy, nigro-punctate, petioles hairy and gland-dotted; *Fl.*—in dense axillary, solitary, 10-30 flowered racemes; *C.*—bluish purple; standard orbicular, clawed; *Fr.*—Pod, ovoid-oblong, closely-pitted, mucronate, black; *Sd.*—one, smooth; *Fl. t.*—Aug.-Dec.

DISTR. :—Throughout India and Ceylon.

OIL :—The seeds, on expression, yield an oil; it is used medicinally. In the Konkan the oil is perfumed and applied to the skin.

### PTEROCARPUS MARSUPIUM Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Indian Kino tree, Malabar Kino tree; *G.* Bia, Bibla; *H.* Bija, Bigash, Hirdokhi; *K.* Benga, Bibla, Honne *M.* Bibla; *Tr.* Bijasal.

CHAR. :—A large deciduous tree, 15-18 m. high; girth 1·8-2·4 m. *Bark* grey, with long vertical cracks, exfoliating in small pieces of irregular shape and size. Leaflets alternate, coriaceous, 5·7, obtuse, acute or emarginate. *Fl.*—numerous, yellowish -white, 1·3 cm. in diam., arranged in paniculate racemes. Petals twice the length of the calyx, waved or curled. Sheath of monodelphous stamens is sometimes deeply divided into 2. *Fr.*—pod, 2·5-5 cm. broad, articular. *Fl. t.*—May-June. *Fr. t.*—Dec.-Mar.

DISTR. :—Throughout the State in deciduous monsoon forests, scattered but not gregarious; ascends to 1,100 m. in Akrani Khandesh and Dangs. Common in N. Kanara, Konkan, Western Peninsula, Madhya Bharat and S. India; Ceylon.

OIL :—It is said to yield an oil of which little is known.

*See*—Medicinal Plants, Gums and Resins, Dye and Tans, Fodder Plants.

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**Oil Plants.**

## PUTRANJIVA ROXBURGHII Wall.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Jaiput, Jivaputrak, Joti, Patji, Putijia, Putra-jiva; *K.* Aumani, Putra-jivi; *M.* Jiwan-putra, Putran-jiva.

CHAR. :—An evergreen tree with pending branches, 9-15 m. high, girth 1·2-1·5, sometimes 2·7 m. *Bark* dark-grey, whitish when young, with numerous horizontal oblong lenticels, corky. *L.*—7·5-12·5 × 2·5-4 cm., elliptic-oblong, acute at both ends, sub-coriaceous, often unequal at the base, serrulate, glabrous and shining above; stipules deciduous. *Fl.*—small, yellow, male numerous, subsessile in globose axillary heads; calyx 3-5-cleft; stamens 3; filaments more or less connate; female flowers solitary or 2-together, axillary, pedunculate; salyx segments 5-6; ovary pubescent, 3-celled; styles 3, dilated into large usually triangular stigmas. *Fr.*—oval, 7-10 by 5-8 lin., smooth, white; not pointed, very hard, rugose, 1-seeded. *Fl. t.*—Mar.-May. *Fr. t.*—ripe next Feb.

DISTR. :—In the evergreen forests of the Konkan and N. Kanara; nowhere common. Kanheri and Alibag jungles, Khandala, sometimes planted. Throughout tropical India, wild and cultivated. From the lower Himalayas eastwards and southwards to Pegu and Ceylon.

OIL :—The seeds yield rather a turbid oil, of an olive-brown colour, which on standing deposits solid portion used for burning.

## RAPHANUS SATIVUS Linn.

FAM.—Cruciferеæ.

COM. NS. :—*E.* Radish; *G.* Mula; *H.* Muli; *K.* Bili-mulangi; *M.* Mula.

DISTR. :—Cultivated as a vegetable, all over the State.

OIL :—The root and the seeds yield oils similar to those obtained from other cruciferous plants. They have a most disagreeable odour. They are sometimes used for burning and for culinary purposes. The seed-oil is colourless, heavier than water, in which it dissolves; it contains a considarable quantity of sulphur.

*See*—Vegetables, Medicinal Plants.

## RICINUS COMMUNIS Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Castor oil plant; *G.* Divaligo; *H.* Arand; *K.* Eranda; *M.* Erand.

DISTR. :—Generally cultivated (Gujarat and S. M. Country).

OIL :—The seeds yield *castor oil* of commerce. There are two primary forms of the plant, the large and the small seeded. The former yields the lamp oil and the latter constitutes the medicinal castor-oil. The oil is used for lubricating all sorts of machinery, clocks, watches; now-a-days in great demand for lubricating air-craft. It is the best lamp-oil in India; it gives an excellent white light superior to that of mineral, vegetable or animal oils. The cold-drawn oil gives a splendid light, it being almost electrical in its brilliancy. It is used in medicine as a purgative. It is the cheapest and the best for the manufacture of all kinds of soaps, candles, pomatums, and perfumed oils. It is also used for dressing leather.

The well-known oil has been used from time immemorial as a purgative, being known to the Greeks and Romans 500 B. C.

The oil-cake forms a valuable manure.

*See*—Medicinal Plants, Fibres.

### ROSA DAMASCENA Mill.

FAM.—Rosaceæ.

COM. NS. :—*E.* Bussora-Damascas-Persian Rose; *G.* Gulab; *H.* Gulab, Sudhurj; *K.* Pannira, Tarana; *M.* Gulab; *Sk.* Atimanjula, Soumyagandha, Shatadala, Lakshmipushpa.

CHAR. :—A perennial shrub, attaining 1·5 m., stems with stout and hooked prickles, sometimes glandular, hairy; *L.*—pinnate, leaflets usually 5 (sometimes 7), ovate-oblong, serrate, 2·5-6·3 cm. long, stipules scarcely dilated; petioles prickly; *Fl.*—usually corymbose, double, red, pink or white, sometimes striped; pedicels and receptacle glandular-hispid; *Fr.*—obovate; *Fl. t.*—all the year.

DISTR. :—Origin unknown. Introduced into Europe from Asia-Minor; cultivated all over India, Punjab and U. P. Gazipur is a chief centre. Extensive cultivation in Bulgaria, France, Italy, Greece and Germany.

OIL :—The essential oil or otto of roses obtained by distillation of flowers is, in many parts of India, used in perfumery; it is also used medicinally.

### RUTA GRAVEOLENS Linn.

FAM.—Rutaceæ.

COM. NS. :—*E.* Common-Garden-rue; *G.* Satapa; *H.* Pismarum Sarab, Satri; *K.* Havananju, Nagadali, Sadabu; *M.* Satap; *Sk.* Sadapaha, Vishapaha.

CHAR. :—A strong smelling herb; glandulose punctate; *L.*—alternate, petioled, decompound; segments cuneate, spathulate or linear-oblong; *Fl.*—in divaricately spreading corymbs; *C.*—petals 4, oblong-obovate, clawed, yellowish; *Fr.*—capsule, obtuse; *Sd.*—angled.

DISTR. :—Egypt and Algeria, cultivated throughout India.

OIL :—The fresh herb, by distillation with water, yields a small quantity of volatile oil. This has a pale yellow colour when fresh but becomes brown by keeping. It has a strong and disagreeable odour and is used medicinally.

## SALVADORA OLEOIDES Dcne.

FAM.—Salvadoraceæ.

COM. NS. :—*G.* Khakananutela ; *H.* Jhal ; *M.* Kinkanela, Pilu.

CHAR. :—A large evergreen shrub or a small tree with a short twisted or bent trunk. *Bark* whitish-grey ; branches stiff, divergent, whitish. *L.*—4·7-5 × ·3-1·3 cm., whitish-green, coriaceous and somewhat fleshy when mature, linear or elliptic-lanceolate, often mucronate, glabrous. *Fl.*—greenish-white, sessile, in erect axillary panicled spikes 2·5-4 cm. long, often clustered. Calyx lobes 4, cleft about half-way down. Corolla little longer than calyx, deeply cleft, lobes obovate-oblong, obtuse. *Fr.*—small, globose, yelow when ripe. *Fl. t.*—Jan.-Apr. *Fr. t.*—June.

DISTR. :—In dry places and saline soils. Often associated with S. *persica.* Apparently confined to Gujarat ; Punjab, Rajasthan ; Sind, Aden.

OIL :—The seeds, on expression, yield an oil of light green colour and with the consistence of butter. The yellowish substance sold in the bazar under the name of *Kharkanela* is much adulterated ; the oil is used medicinally for local application.

*See*—Foder Plants.

## SALVADORA PERSICA Linn.

FAM.—Salvadoraceæ.

COM. NS. :—*E.* Mustard Tree of Scriptures, Tooth-brush tree ; *G.* Kharigal, Pilu, Piludi ; *H.* Jal, Pilu ; *K.* Goni ; *M.* Khakan, Pilu.

CHAR. :—A large much-branched evergreen shrub or a small tree, sometimes 9-12 m. high with girth 1·2-1·5 m. Branchlets pendulous. *Bark* thin, grey. *L.*—2·5-5 × 2·5 cm., oval or ovate to narrow-lanceolate, entire, coriaceous, very smooth and shining and glaucous on both sides. *Fl.*—greenish-white on slender pedicels arranged in axillary and terminal lax panicles longer than the leaves. Calyx-lobes 4 parted, ciliate. Corolla cleft almost to the base into 4 generally reflexed lobes. *Fr.*—berry globose, smooth, fleshy, red when ripe, embraced at the base by the persistent clayx. *Fl. t.*—Nov.-May; more or less all the year round. *Fr. t.*—rainy and in some places cold season. Old leaves shed in Apr., new ones reappearing almost simultaneously.

DISTR. :—In the dry districts of the State; S. M. Country, Dharwar and Belgaum districts; often on the bunds of tanks in open places near villages of the black soil country; also found in saline soils and littoral forests near the coasts of Gujarat, the Konkan and N. Kanara. Drier parts of India, often planted near Muslim tombs, Sind, Ceylon, W. Asia, Egypt, Abyssinia.

OIL :—Like the preceding.

The leaves and peduncles contain a large amount of essential oil.

*See*—Medicinal Plants, Fodder Plants.

### SAMADERA INDICA Gærtn.

FAM.—Simarubcaceæ.

COM. NS. :—No common names.

CHAR. :—A small tree, with stout branches, 9-10·5 m. high. ***Bark*** pale yellow, transversly cracked. *L.*—15·6-26 × 7·8 cm. oblong or elliptic-lanceolate, acute or obtuse at the apex, narrow at the base, coriaceous, fleshy, glabrous, shining, quite entire, generally furnished with 2 hollow glands at the base near the insertion of the petiole, and often with similar ones spread over the blade; petiole thick. *Fl.*—yellow-white or purplish, numerous, in dense umbels. Peduncles very long; pedicels small Calyx segments 4-5, small, persistent in fruit. Petals linear-oblong. Stamens twice as many as the petals. Filaments with a scale at the base. Ovary generally 4-celled. *Fr.*—drupe, 4-2·6 cm. with a very thick pericarp. *Fl. t.*—cold season. *Fr. t.*—Mar.-Apr.

DISTR. :—Throughout south Konkan jungles; jungles near Goa; along river banks. Indigenous on the Malabar coast; Ceylon.

OIL :—The seeds, on expression, yield an oil used medicinally.

### SANTALUM ALBUM Linn.

FAM.—Santalaceæ.

COM. NS. :—*E.* The White-Sandal-wood tree; *G.* Suket; *H.* Chandan, Chandal, Sandal; *K.* Gandada, Gandha; *M.* Chandan.

CHAR. :—A small evergreen glabrous tree with slender drooping branches. ***Bark*** dark-grey, nearly black, rough, with short vertical cracks, inner substance dark-red. *L.*—opposite, 4-6·3 × 1·6-3·1 cm., elliptic-lanceolate, sub-acute; entire, thin, base acute. *Fl.*—brownish purple, inodorous, in terminal and axillary paniculate cymes shorter than the leaves. Perianth campanulate; limb of 4 valvate traingular segments. Stamens 4. *Fr.*—globose, 1·3 cm. diameter, purple-black; endocarp hard, ribbed. *Fl. t.*—Mar.-Aug. *Fr. t.*—cold and hot seasons.

DISTR. :—Western Peninsula from near Poona southwards; indigenous throughout the dry districts of the State; also abundant in some of the dry deciduous forests of N. Kanara; often along the bunds of tanks and in hedges; dry regions of S. India, Mysore, Coorg, Nilgiris, Coimbatore.

OIL :—The oil is present in all parts of the sandal-wood tree. Varying in proportions and quality, the roots yield 6 %, leaves and shoots 4 %, bark 2, the reddish heartwood 5-7 %. Heartwood is odourless when fresh, but has a strong aromatic odour when dry. The seeds of the sandal-wood tree yield, by expression, a black and viscid oil, which is burnt by the poorer classes in lamps. Wood on distillation yields an essential oil. The roots yield the finest quality. The sap-wood is rejected for distillation. Sandal-wood oil is transparent, but of a pale-yellow colour and is one of the most favoured base for indian perfumes. It is used in perfumery, ritualistic ceremonies and also medicinally. It is very largely used in soap-making. Its value in perfumery and soap-making lies in its fixtive power. Mysore Government has large establishments for extracting the oil. Large quantities are exported to China, Arabia and Europe.

## (SAPINDUS TRIFOLIATUS Linn.)

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## SAPINDUS LAURIFOLIAS Vahl.

FAM.—Sapindaceæ.

COM. NS. :—*E.* Soap-nut tree; *G.* Arilha; *H.* Ritha; *K.* Anthuvala, Burugukayi, Kugala, Phenilu; *M.* Ritha, Ringin.

CHAR. :—A large handsome tree, trunk straight, girth ·9-1·2 m. *Bark* shining, grey, with rough deciduous scales. *L.*—2·1-36 cm long, paripinnate, alternate. Leaflets 4-6, 8·1-19·5 × 4-8 cm., ovate or oblong-lanceolate, acuminate at the apex, sometimes obliquely-sided at the base, entire, glabrous, shining above, soft-pubescent beneath, on petiole 2-3 lin. *Fl.*—numerous, small, dull-whitish, in large, terminal, much-branched panicles which are clothed with rusty pubescence. Calyx rusty pubescent on the outside. Petals covered externally with adpressed hairs, sometimes furnished on inner surface with a membranous scale, fringed with long white hairs. *Fr.*—fleshy, 3-lobed, soft when ripe, of a brownish colour. Seed round, obovate. *Fl. t.*—Oct.-Dec. *Fr. t.*—Feb.-Apr.

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DISTR. :—Throughout the State; usually planted about villages. Both the varities are found in North Kanara. Var.—*laurifolia* is indigenous on the W. ghats in evergreen forests, Madras State, Aravali hills, both wild and cultivated.

OIL :—From the seeds a semi-solid oil is obtained which is regarded as having medicinal virtues, and used externally. It is regarded as too costly for general use.

*See*—Medicinal Plants.

## SAPIUM SEBIFERUM Roxb.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Tallow Tree; *M.* Pipalyank.

CHAR. :—A moderate-sized handsome deciduous tree. *Bark* grey with shallow vertical cracks. *L.*—rhomboid, entire on long slender petioles. *Fl.*—in terminal spiciform racemes. Ovary glabrous. Styles 3, long spreading, recurved. *Fr.*—capsule, coriaceous, subglobose, shortly pointed, seeds enclosed in a thick layer of white fatty substance (vegetable tallow), attached to a central column which splits into 3 slender divisions. *Fl. t.*—June *Fr. t.*—ripe in Oct. Leaves turn scarlet or orange before falling.

DISTR. :—A native of China and Japan. Introduced and cultivated throughout N. India. Occasionally cultivated in gardens near Bombay.

OIL :—The fruit of this tree is three-celled; each cell contains a single globose seed, thickly coated with a white greasy substance—the so called vegetable tallow. This substance is used in place of animal tallow, in China, for the manufacture of candles and in soap making and also dressing cloth. From the shell and the seed, oil is extracted which is burnt in lamps. Tallo is separated from the seeds by steaming process. Tallow prepared in India is not as hard as that of China, and when used in candle-making it is necessary to dip the candle into wax to give them a hard external coating.

*See*—Dyes and Tans.

## SCHLEICHERA OLEOSA Merr.

## (SCHLEICHERA TRIJUGA Willd.)

FAM.—Sapindaceæ.

COM. NS. :—*E.* Ceylon-oak, Gum-lac tree or Honey tree; *G.* Kossama; *H.* Gausam, Kosum, Kulimaya, Kukuli, Sagada, Shargodi; *M.* Kohan, Kusumb, Peduman; *Tr.* Kusum.

CHAR. :—A large beautiful deciduous tree with deeply furrowed trunk, sometimes 18-21 m. high, girth 2·4-3·6 m. *Bark* grey, exfoliating in small rounded plates of irregular shape and size. Young parts

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**Oil Plants.**

puberulous. *L.*—abruptly pinnate, 21-42 cm. at the ends of branches. Leaflets 4-8, 2·5-26 × 1·7-11 cm., opposite or sub-opposite, oblong, elliptic-oblong or nearly lanceolate, the lowest pairs the smallest, obtuse or shortly acuminate, entire, coriaceous, sessile. *Fl.*—small, yellowish-white or greenish on short pedicels, arranged in axillary, branched racemes. *Fr.*—2-2·5 cm. long, smooth, ovoid, unarmed or sometimes echinate. *Fl. t.*—Feb.-Mar. Sheds leaves in cold season; new leaves in Feb.-Mar.

DIST. :—Common throughout India and the State in both dry and moist forests from the N. W. Himalaya to Madhya Bharat and South India; Ceylon, Burma.

OIL :—The seeds yield an oil which is used in Malabar for culinary and lighting purposes. It is reputed to be the original *Macassar* oil.

*See*—Medicinal Plants.

## SEMECARPUS ANACARDIUM Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Marking Nut tree; *G.* Bhilamu; *H.* Bhela, Bhilava, Bilarah; *K.* Gerkayi, Keru; *M.* Biba, Bibwa.

CHAR. :—A moderate-sized deciduous tree; trunk erect, 9-12 m. high, girth about 1·2 m. *Bark* 1·3 cm., thick, dark-brown, rough, exfoliating in very irregular inner patches; inner bark fibrous; dioecious; young branches, inflorescence, petioles and the under side of leaves covered with a short, pale pubescence. *L.*—23-47 ×13-31 cm., approximated near the ends of branches, oblong or obovate-oblong, rarely linear-oblong, usually contracted below the middle, rounded at the top, rounded, cordate or cuneate at the base, thick coriaceous, on rounded, thick petiole; nerves 16-25 pairs, conspicuous. *Fl.*—greenish-white or yellow, small, sub-sessile, fascicled, arranged in erect, large, terminal panicles as long as the leaves or shorter. Petals 3-4 times the length of the calyx, spreading, glabrous. Stamens 5, filaments slender; ovary densely tomentose. Styles 3. *Fr.*—drupe, obliquely oval or oblong, smooth, shining, purplish black; cup-shaped hypocarp, orange-red, fleshy and edible. *Fl. t.*—varies but generally in the hot season. *Fr. t.*—Nov.-Feb. Sheds leaves in Feb.; new leaves in May.

DISTR. :—In decidious dry forests throughout the State. Abundant in dry forests of Konkan, Deccan and Gujarat; sub-Himalayan tract from the Beas eastwards; Assam, Khasia hills, Chittagong, Madhya Bharat and W. Peninsula; *E.* Archipelago, Australia.

OIL :—Two oils are obtained from this plant. One black and acrid from the pericarp of the nut, which gives about 32% of the oil. It is vescicating and blackens on exposure to the air. It is used to floors, wooden rafters, etc. to prevent the ravages of white ants. The second oil from the kernel, which is remarkably sweet, edible and wholesome, might be employed for pharmaceutical purposes.

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins, Poisonous Plants.

### SESAMUM INDICUM Linn.

FAM.—Pedaliaceæ.

COM. NS. :—*E.* Sesame; *G.* Tal; *H.* Gingli; *K.* Ellu; *M.* Til.

DISTR. :—Cultivated and wild. In the Bombay State it is grown fairly extensively.

OIL :—The oil is extracted from the seeds by simple pressure. There are two forms of the plant one with white seeds and the other with black ones. The latter form is much more common and yields better oil. It is clear, limpid and varies from pale-yellowish to dark-amber in colour. It has no smell and is not liable to becomes rancid, if kept for years. It is used for culinary purposes, for anointing the body, in the manufacture of sweet-meats and for adulterating ghee. It is used in the manufacture of soaps and also for burning in lamps; it gives a clear light than other vegetable oils but burns more rapidly. In England it is chiefly used for soap-making. In Japan it substitutes butter. Oil from the black variety is used more for medicinal purposes. It is also extensively used in the manufacture of Indian perfumes. This oil forms the basis of most of the fragrant and scented oils, used either medicinally or for body.

The oil-cake is much prized as a cattle food. It is also consumed by poorer people in times of distress.

### SPINACIA OLERACEA Linn.

FAM.—Chenopodiaceæ.

COM. NS. :—*E.* Spinach; *M.* Palak.

DISTR. :—A small herb grown in the gardens in the State.

OIL :—The seeds are reported to yield a fatty oil.

### STRYCHNOS NUX-VOMICA Linn.

FAM.—Loganiaceæ.

COM. NS. :—*E.* Crow-Fig, Kachita, Nux-Vomica or Strychnin tree, Poison tree; *G.* Kuchla; *H.* Kajra, Kuchala, Nirmal; *K.* Hemushti, Imangi, Kajavara, Kasarakana; *M.* Kajra, Kuchla.

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CHAR. :—A large deciduous tree, often with short sharp strong axillary spines, 12-15 m. high (sometimes reaching 30 m.); girth ·9-1 2 m. *Bark* thin, grey, smooth or rough with lenticels. *L.*—7·5-10 × 5-8 cm., ovate or nearly orbicular, acute at the apex or quite rounded, coriaceous, shining above and glaucous beneath, prominently 3·5-nerved. *Fl.*—greenish-white or terminal, pubescent, trichotomous corymbose cymes. Corolla-tube cylindric. Ovary with numerous ovules. Stigma peltate. *Fr.*—berry, globular, size and colour of an orange. Seeds numerous, about 1·3 cm. long, flat, shining, circular or reniform. *Fl.* t.—Mar.-Apr. *Fr. t.*—ripe at various times throughout the year. Sheds leaves for a short while in hot season, new foliage almost simultaneously. Flowers have a strong odour of turmeric.

DISTR. :—Moist monsoon forests, very common in Konkan and N. Kanara; abundant on laterite along sea-cost. More or less throughout Tropical India including N. Circars, Karnatak, West Coast of Madras State, Travancore; Ceylon, Indo-China, Laos.

OIL :—An empyreumatic oil is prepared from the fresh seeds. It is used medicinally.

*See*—Medicinal Plants, Poisonous Plants.

## SYZYGIUM JAMBOS Alst.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Malay of Rose-apple, Gulabjaman; *K.* Jambu, Pannecrli; *M.* Gulabjamb.

CHAR. :—A small evergreen tree. *L.*—opposite, 12·5-20 cm. long, lanceolate, narrowed into a short petiole; secondary nerves joined by prominent intramarginal nerve. *Fl.*—in short terminal racemose cymes, with pairs of flowers, large, handsome, showy with long stamens, greenish-white. *Fr.*—globose, white, 2·5-5 cm., fleshy, scented. Seeds 1-2, grey, loose in the cavity. *Fl. t.*—Feb.-Mar. *Fr. t.*—July-Aug.; also at the other times during the year.

DISTR. :—Cultivated, also wild. Cultivated occasionally in the gardens in the State. Some fine trees are planted on the hill fort of Pratapgad near Mahableshwar. Run wild and planted near villages in N. Kanara; Sikkim Tarai; Yunan to Australia.

OIL :—The leaves and young shoots yield an essential oil, used in the preparation of Eucalyptus-soap; used also medicinally.

*See*—Medicinal Plants, Fruit Trees,

### TAMARINDUS INDICA Linn.

FAM.—Cæsalpinaceæ.

SECTION 2.
—
Oil Plants.

COM. NS. :—*E.* Tamarind tree; *G.* Amli; *H.* Amli, Imli, Nuli, Teter; *K.* Amla, Amlike, Hunase; *M.* Chinch.

CHAR. :—A large evergreen tree, 12-18 m. high. *Bark* 1·3 m. thick, dark-grey, with longitudinal fissures and horizontal cracks. *L.*—abruptly pinnate, 5-12·5 cm. long; rachis channelled; leaflets sub-sessile, 10-20 pairs, closely set. *Fl.*—in lax few-flowered racemes at the end of branchlets; corolla petals 3 (one upper and 2 lateral), sub-equal, yellowish with pink stripes; stamens 3 fertile. *Fr.*—pod, 7·5-20 × 2·5 cm., 1 cm. thick, slightly curved, scurfy, seeds 3-12, obovate-oblong, truncate ends with a shallow oblong pit on each of the flat faces, brown, shining. *Fl. t.*—Apr.-June. *Fr. t.*—ripe Feb.-Mar.

DISTR. :—Evergreen forests of Konkan and N. Kanara; shady parts of rain forests. Self-sown near villages and in waste lands, also cultivated throughout the State. Throughout India and Tropics, generally, indigenous in tropical central Africa.

OIL :—The seeds, on expression, yield an oil of amber colour; it has no smell and is sweet to the taste. There is diversity of opinion regarding the percentage of oil—present in the seeds and the uses to which is is put. The subject appears to be well worthy of further investigation.

*See*—Medicinal Plants, Condiments and Spices, Dyes and Tans.

### TECTONA GRANDIS Linn.

FAM.—Verbenaceæ.

COM. NS. :—*E.* Indian Oak, Ship-Tree, Teak; *G.* Sag, Sagach; *H.* Sagun, Sagwan; *K.* Tega, Tegu; *M.* Sag, Sagwan; *Tr.* Teak.

CHAR. :—A large deciduous tree, 21-30 m. high, girth 3·6-4·5 m. (occasionally exceeding 6 m.). *Bark* light-brown or grey, fibrous, with shallow longitudinal cracks, outer bark peeling off in long thin flakes. Branchlets quadrangular, channelled, stellately tomentose. *L.*—opposite 30-60 × 15-30 cm. (much larger in seedlings), rough above, grey tomentose beneath. *Fl.*—shortly pedicelled in cymes. Corolla tubular, 5-6 lobes, lobes unequal, white. *Fr.*—Sub-globose, somewhat 4-lobed, pericarp dense hairy, endocarp bony. *Fl. t.*—June-Sept. *Fr. t.*—Nov.-Jan. Sheds leaves early in cold season, new foliage in May.

DISTR. :—Throughout the State in monsoon and mixed deciduous forests; abundant all along the slopes of Western ghats to the Mahi river in Gujarat. Best teak-forests in the State are on the slopes of Kalindi and the Gangavali rivers of N. Kanara. Western ghats of Madras State, Circars, Madhya Bharat; Malay Peninsula, Burma, Sumatra, Java.

OIL :—The seeds yield a bland, fatty oil, which is very difficult to extract; it is said to be used medicinally.

*See*—Medicinal Plants, Dyes and Tans, Gums and Resins.

## TERMINALIA BELERICA Roxb.

FAM.—Combretaceæ.

COM. NS. :—*E.* Bastard Myrabolan, Bedda Nut, Beleric Myrabolan; *G.* Behedo, Beheza, Bera; *H.* Bahara, Buhura, Sagona; *K.* Shantimara, Tare, Vibhata; *M.* Beheda, Bela; *Tr.* Behera.

CHAR. :—A large handsome deciduous tree, 18-39 m. high, girth 2·4-6 m. *Bark* bluish or ashy-grey with numerous fine longitudinal cracks, yellow inside. Young branchlets and calyx clothed with rusty pubescence. *L.*—7·5-15 cm. crowded at the end of the branches, alternate, coriaceous, broadly-elliptic or obovate-elliptic, obtuse, retuse, or short-acuminate at the base, often unequal at the base, deciduous; petioles 2·5-6·5 cm. *Fl.*—small, grey or greenish-yellow with an offensive smell, arranged in simple solitary, axillary or infra-axillary spikes, upper-flowers of the spike male, lower hermaphrodite. Calyx pubescent with long rusty hairs inside. *Fr.*—1·3-2 cm. diam., ovoid, grey, when dry obscurely 5-angled . *Fl. t.*—Feb.-May. *Fr. t.*—next rainy and cold season. Sheds old leaves Feb.-Mar.; new leaves Apr.

OIL :—The seeds yield a fatty oil, to the extent of about 30-44% which on standing separates into two portions, the one fluid, of a pale-green colour and the other semi-solid, white, with the consistency of ghee; used medicinally.

*See*—Medicinal Plants, Gums and Resins, Fodder Plants.

## TERMINALIA CATAPPA Linn.

FAM.—Combretaceæ.

COM. NS. :—*E.* The Indian Almond; *H.* Bengali-badam; *K.* Taree; *M.* Deshi-badam.

CHAR. :—A large deciduous (in Bombay almost evergreen) handsome tree, 9-12 m. high (in favourable conditions 18-24 m.), girth 1·8-2·4 m. Branches whorled, horizontal, forming tablelike tiers. *L.*—15-23 cm., generally softly hairy when young or glabrous, chartaceous, alternate, crowded at the ends of branches, obovate, oblong, apiculate, base cordate or narrow-rounded with a depressed gland on each side of the midrib. *Fl.*—small, greenish-white, forming solitary axillary spikes, shorter than the leaves; the upper flowers male, the lower hermaphrodite. *Fr.*—oval, or ellipsoid, compressed, with 2-elevated margins, 2·5-4 cm., rather convex on both sides. *Fl. t.*—cold season. *Fr. t.*—rainy season.

DISTR. :—Planted in gardens in Bombay and Poona; also planted in the Konkan and N. Kanara. A native of the Moluccas.

OIL :—The kernels yield a valuable oil similar to almond oil in flavour, odour and specific gravity; but a little more deeply coloured. It deposits stearine on keeping. It does not become rancid so readily as true almond oil. It is easily made edible. Though easily made edible and pleasant in flavour, it appears to have been entirely neglected. As the tree is fairly common and the fruit could be obtained cheaply, "Indian almond oil" appears to merit the attention of dealers.

*See*—Dyes and Tans.

### TERMINALIA CHEBULA Retz.

FAM.—Combretaceæ.

COM. NS. :—*E.* Black or Chebulic-myrabolan; *G.* Hirdo; *H.* Har, Harara, Haria; *K.* Alate, Harade, Haritaki; *M.* Hirda.

CHAR. :—A moderate-sized much-branched, deciduous tree, 7·5-10·5 m. high, in favourable circumstances 24-30 m., girth 1·5-3·6 m. *Bark* dark-brown with numerous generally shallow vertical cracks. Young parts more or less rust-coloured or silvery-hairy. *L.*—not clustered, mostly sub-opposite, ovate, or ellipticovate, acute and rounded at the base, 7·5-13 cm., deciduous; petiole often with 2 glands near the summit. *Fl.*—all hermaphrodite, dull-white, or yellowish, subtended with a downy bracteole, arranged in terminal, often panicled, spikes, 5-10 cm. long. *Fr.*—ellipsoidal or obovoid from a cuneate base, more or less distinctly 5-angled. *Fl. t.*—May-June. *Fr. t.*—in the next cold season. Sheds leaves in Feb.-Mar.; new leaves in Apr.

DISTR. :—Moist parts of the Deccan, on trap and common along ghats, common in Khandesh, Akrani, monsoon forests of Belgaum district and N. Kanara. Troughout the greater part of India up to 1,500 m., in the Himalayas, Travancore, Burma, Ceylon.

OIL :—The kernels yield a small quantity of oil. It is clear, transparent, almost colourless; used medicinally.

*See*—Gums and Resins, Dyes and Tans.

## THESPESIA POPULNEA Corr.

FAM.—Malvaceæ.

SECTION 2.

Oil Plants.

COM. NS. :—*E.* Tulip tree, Portia tree; *G.* Bendi, Paraschapipla; *H.* Parsipu, Parascha Jhad; *K.* Asha, Huvarsi; *M.* Bhend.

CHAR. :—A moderate-sized, evergreen tree; attaining a height of about 9-10·5 m. and girth of about ·9-1·2 m. *Bark* grey, smooth. All young parts covered with small rusty peltate scales. *L.*—7·8-13 × 7·8 cm., cordate, ovate, acute, acuminate or almost cuspidate, leathery, entire, glabrous, 5-7-nerved, with a glandular pore beneath, between the nerves; petiole long, usually 6·5 cm. Stipules falcate. *Fl.*—large, pale, sulphur-coloured, turning reddish, on axillary, slender peduncles. Bracteoles (epicalyx) 5, oblong-lanceolate, deciduous, as long as the bell-shaped, 5-toothed calyx. Corolla 5·2-7·8 cm. diam. Staminal tube 5-toothed at the apex Ovary 5-celled. Style club-shaped, 5-furrowed. *Fr.*—capsule, 4 cm., coraiseous, globose, somewhat depressed, sprinkled with minute scales, ultimately glabrescent, 5-celled, indehiscent or opening slightly on the top. Seeds 2 in each cell, large, shortly tomentose or pilose. *Fl. t.*—throughout the year.

DISTR. :—Along the sea-shores of the Konkan and the N. Kanara; coast forests of India, Burma, Ceylon and Andamans; often cultivated as a road-side tree in towns near the sea-coast as at Calcutta, Madras, Bombay, Colombo.

OIL :—The fruits yield a deep-red coloured and somewhat thick oil, the value of which is as yet unknown. Bark also is said to yield an oil. Compound oil of the bark and capsule was given in cases of urethritis and gonorrhoea with beneficial results (Koman). It might be employed beneficially in skin diseases.

*See*—Medicinal Plants, Fibres, Foder Plants.

## THEVETIA NERIFOLIA Juss.

FAM.—Apocynaceæ.

COM. NS. :—*E.* Exile or yellow Oleander; *G.* Pila kaner; *H.* Pila kanir, Zard kunel; *M.* Pivali kanher; *Sk.* Ashvaghna, Haripriya, Karvira, Shatakumbha.

CHAR. :—Large evergreen glabrous shrub, with milky juice; *L.*—spirally arranged, 7·5-12·5 cm. long, linear, bright green and shining above, crowded; *Fl.*—in terminal cymes, 5 cm. across, yellow;

*C.*—tubular, throat campanulate, lobes 5; corona in the throat; *Fr.*—broadly obovate, elliptic, exocarp fleshy, mesocarp bony, endocarp corky; *Sd.*—generally 4.

DISTR. :—Native of S. America and W. Indies; often planted in India.

OIL :—The seeds yield a bright yellow oil. It burns well without giving off much smoke. It is used medicinally.

## TODDALIA ACULEATA Pers.

FAM.—Rutaceæ.

COM. NS. :—*E.* Lopezroot Tree, Forest Pepper; *H.* Dehan, Gangalaki, Mirchi; *K.* Kadu-hakukare, Kadu-menasu, Macimullu; *M.* Jangali-Mirchi, Limri, Manger; *Sk.* Dahan.

CHAR. :—An evergreen scandent shrub, 15 m. high, armed with small hooked prickles; *L.*—alternate, digitately trifoliate; leaflets sessile 5-10 × 1·8-3·8, oblong, crenulate, coriaceous, dark shining green above; *Fl.*—in axillary cymes, white, unisexual; *male flower* bud globose, ovary rudimentary; *female flower* buds oblong, stigma sessile, 5-7 lobed; *Fr.*—globose, size of a large pea, 3-5 grooved, orange coloured, pitted on the rind; *Fl. t.*—Aug.-Jany.

DISTR. :—All over the Madras State; Kumaon to Bhutan; Khasia Hills; Ceylon; Sumatra; Java; China; Philippines; tropical Africa.

OIL :—The leaves yield on distillation, a pale yellowish-green, limpid oil, having an odour of citron peel and a bitter aromatic taste.

## UVARIA NARUM Wall.

## (UVARIA HOOKERI King.)

FAM.—Anonaceæ.

COM. NS. :—No names.

CHAR. :—A climber. *L.*—oblong-lanceolate. *Fl.*—reddish, solitary, terminal.

DISTR. :—Konkan, Western ghats.

OIL :—The roots on distillation yield a sweet-scented oil; used medicinally in Malabar.

## VATERIA INDICA Linn.

FAM.—Dipterocarpaceæ.

COM. NS. :—E. Indian Copal or Piney Varnish tree, Malabar White Pine; *K.* Dhupada, Gugle, Illupathla, Munda dhupa; *M.* Dhupa; *Tr.* Vollapiney.

**SECTION 2.**
**—**
**Oil Plants.**

CHAR. :—A large handsome evergreen tree, young shoots and inflorescence clothed with scurfy stellate tomentum; stem cylindrical, sometimes 1·5 m. in diameter. *Bark* whitish-grey, rough, peeling off in round thick flakes. *L.*—coriaceous, glabrous, elliptic-oblong, blade 10·4-26 cm. long, petiole 2·6-4 cm. long; midrib and secondary nerves (14-16 pairs) prominent beneath. *Fl.*—1·34 cm. across, in large terminal panicles. Petals spreading slightly pubescent outside, stamens 40-50, filaments short, anthers linear, hairy at the base. Ovary tomentose. *Fr.*—ovoid, 5·2-6·54 cm. long, splitting open in 3 valves. Cotyledons filled with fat (piney tallow). *Fl. t.*—Mar.-Apr. *Fr. t.*—rainy season. Young leaves appear in cold season.

DISTR. :—Evergreen forests along the Western ghats. This tree was formerly planted along the avenues and roads in N. Kanara by the Sonda Kings; Western India; also planted in the moister districts of Mysore; abundant in S. Kanara.

OIL :—The seeds contain a large quantity of solid oil. It is prepared by boiling powdered seeds in water. The oil is solid even in hot climate, and appears to be well adapted for making candles. In S. Konkan, it is used for lamps, for flavouring food, as a substitute for ghee and for medicinal purposes.

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*See*—Medicinal Plants, Gums and Resins.

## VENTILAGO CALYCULATA Tulas.

FAM.—Rhamnaceæ.

COM. NS. :—*H.* Raidhani, *M.* Kanvel, Karkandicha-vel.

CHAR. :—An extensive climber. *L.*—elliptic-oblong, serrate, base oblique, rounded or acute. *Fl.*—numerous in densely hairy paniculate spikes, greenish, with an offensive odour. *Fr.*—winged, girth about the middle by persistent calyx.

DISTR. :—Konkan, in deciduous forests, Southern Maratha Country; throughout the hotter parts of India; Java.

OIL :—The seeds yield an oil which resembles ghee in taste and is used in Chota Nagpur for cooking purposes (Campbell).

## VETIVERIA ZIZANOIDES Stapf.

FAM.—Gramineæ.

SECTION 2.
—
Oil Plants.

COM. NS. :—*E.* Cuscus grass, Koosa; *G.* Valo; *H.* Bala, Bena, Khas, Panni; *K.* Lavancha, Mudivala, Kuruvelu; *M.* Vala; *Sk.*—Shit-Sugandhi-mulak, Ushira, Veemam.

CHAR. :—A densely tufted perennial grass; root-stock branching with spongy aromatic roots. Culmus stout, up to, over 1·8 m. high, usually sheathed all along. *L.*—Leaf-sheaths compressed, lower ones keeled and fan-like, blades narrowly linear 30-90 cm. long erect, pale green, margin spinously rough. *Fl.*—panicle up to 30 cm. long; rachis stout, whorls 6-10 with up to 20 rays; racemes up to 5 cm., slender. Sessile spikelets, colour varying from yellowish to black.

DISTR. :—Practically over the whole of India eastwards to Burma; Lower Guinea in Tropical Africa; throughout the Malayan regions, West-Indies and Brazil.

OIL :—Vetiver oil is obtained by distilling roots with steam. It is the most viscid of the essential oils and its sparing volatility is taken advantage of in fixing other perfumes. It is employed in most favourite scents and in perfuming soaps in Europe. In India, it is used as a perfume (Attar) and for flavouring sherbat; used also medicinally.

*See*—Fibres.

## WAGATEA SPICATA Datz.

FAM.—Leguminosæ Cæsalpinioideæ.

COM. NS. :—*K.* Hooliganji, Wagati; *M.* Wagati, Wakeri.

CHAR. :—A robust woody climber, branches armed with recurved prickles; *L.*—2-pinnate, 23-30 cm. long; main rachis armed with prickles, pinnæ 4-6 pairs, 7·5-12·5 cm. long; leaflets 5-7 pairs, coriaceous, oblong, dark-green; *Fl.*—sessile in dense spicate racemes raching 60 cm. long; rachis grooved with soft hairs, armed with prickles; *C.*—petals 5, inserted on the top of calyx-tube, obovate-spathulate, dark-orange; *Fr.*—pod, linear oblong, swollen above the seeds, constricted between them; *Sd.*—3-4, oblong, hard, bony. *Fl. t.*—Jany.-Feb.

DISTR. :—Hills of the Western Peninsula.

OIL :—It is said that seeds yield an oil used for burning in lamps. The oil is worthy of attention.

## XANTHIUM STRUMARIUM Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Bur-Weed, Clot-Cockle-bur ; *G.* Gadrian ; *H.* Banokra, Shankhahuli ; *M.* Dumundi, Dutundi, Sankeshwar ; *Sk.* Aristha, Itara, Kambu-Vanamalini, Sarpakshi.

**SECTION 2.**

**Oil Plants.**

CHAR. :—Annual herb ; stem short, stout, rough with short hairs ; L.—many, 5-7·5 cm. long and broad, broadly triangular-ovate or suborbicular ; 3-lobed, hairy on both sides, irregularly inciso-serrate ; *Fl.*—heads in terminal and axillary racemes, barren heads many, at the top, fertile heads few, axillary ; involucre of fertile head, ovoid in fruit, 1·6 cm. long, with 2 erect beaks, thickly clothed with hooked prickles, hard and tough ; *Fr.*—achene, 1·3 cm., oblong ovoid, compressed ; Fl. t.—Jany.-Feb.

DISTR. :—Throughout India, Ceylon and warmer parts of the world.

OIL :—The seeds are said to yield an oil used in medicine and also for illumination.

## XYLIA DOLABRIFORMIS Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Iron Wood tree of Pegu and Arakan ; *H.* Jambu ; *K.* Jambe, Tirawa ; *M.* Jambhha, Suria, Yerul, *Tr.* Irul.

CHAR. :—A large deciduous tree, 15-18 m. (sometimes 30 m.) high ; girth 2·6-3·6 m. *Bark* grey or reddish-brown, with short cracks irregularly distributed, scaling off in great thick irregular patches.

*L.*—bipinnate, pinnæ 2 ; leaflets 4-10, opposite, oblong, acute, sub-coriaceous, 7·5-15 cm. long, the terminal leaflet much larger. *Fl.*—yellowish, sessile, in dense peduncled heads, crowded on 2·5-5 cm. long peduncles arising from above the scars of the fallen leaves. Corolla small, Stamens 10. *Fr.*—pod, woody, falcate, flat, greyish-brown, 10-15 × 2·5-6·3 cm., 6-10 seeded. *Fl. t.*—Mar.-Apr. *Fr. t.*—Oct. Nov. Sheds leaves during hot season.

DISTR. :—Throughout the deciduous forests from Kolaba district to Savantwadi ; Madhya Pradesh, South India ; Burma, Singapore and the Philippines.

OIL :—The seeds yield an oil of which nothing is known.

*See*—Gums and Resins, Fodder Plants.

सत्यमेव जयते

# PLANTS YIELDING DYES AND TANNING MATERIALS.

## ACACIA ARABICA Willd.

FAM.–Mimosaceæ.

COM. NS. :–*E.* Babul, Indian Gum Arabic; *H.* Babul, Babus; *K.* Gobli, Jali, Jaligida; *M.* Babhul, Babul; *Tr.* Babul.

SECTION 3.
—
Dyes and Tans.

CHAR. :–A moderate-sized or a large tree. *Bark* dark-brown or black, longitudinally fissured. *Branches* thorny. *Spines* 6-5 cm. long, large, white, often with brown points, straight, somewhat ascending. *L.*–rachie downy with several cup-shaped glands; pinnæ generally 6-12, 1·3-4 cm. long; leaflets 20-40, linear, membranous, ·6 cm., glabrous or downy. *Fl.*–yellow, in globose heads. Peduncles slender, grey-donny, with bracts in the middle, 3-6 fasciculate. Corolla campanulate, twice the length of the calyx. *Fr.*–pod, coriaceous, densely grey-downy, stalked, 7·5-10 cm. × 1·3 cm. moniliform, 8-12 seeded. *Fl. t.*– June-Jan. (rainy season) *Fr. t.*–cold season.

There are two varieties. *Var. cupressiformis* Stew-branches erect, like a cypress in growth, called *Ram-Kanta. Var·vediana*–bark more deeply cracked, crown formed of twisted angular branches; spine white, stout; pods flat, called *Vedi-babul.*

DISTR. :–Throughout the dry districts of the State; forms extensive forests in the black-soil country of the State proper. Indigenous in Gujarat and N. Deccan, Punjab, Bihar, Rajasthan, Western Peninsula, Ceylon, Arabia, Egypt, Tropical Africa, Natal.

DYES AND TANS :–Babul bark is the most important tanning material of N. India. It is used in village tannaries from the Punjab to Bengal and very large quantities are consumed by the tanning industry at Kanpur. Bark is mainly obtained as a by-product. Tanning contents vary from 12 to 20%. Leather made from the bark is firm and durable though harsh and dark coloured. (It is good for heavier leather.) Bark is used as dye in calico-printing.

Pods contain 12 to 19% of tannin. They are rarely used for tanning in India. Chief defect of the pods as a tanning material is their tendency to ferment. They are used to some extent by local tanners for drenching or bating after the liquor has fermented. They impart good colour and softening effect to the leather.

The chief area producing babul bark on commercial quantities is the Central Circle of Bombay where it forms riverine forests.

*See* Medicinal Plants, Gums and Resins, Fibres, Fodder Plants.

## ACACIA CATECHU, Willd. Var. Sundra Prain.

FAM.—Mimosaceæ.

SECTION 3.
—
Dyes and Tans.

COM. NS.: —*E.* Black pegu catechu, Cutch; *G.* Kher, Kherio, Khiriobaval; *H.* Katha, Khair, Khair-babul; *K.* Kachu, Kaggali, Kanti; *M.* Khair; *Sk.* Dantadhavan; Khadira, Kushthari, Saradruma, Yajnika.

DISTR. :—Rajastan, Western Peninsula, Himalayas up to 1700 m., Sikkim, Pegu, Burma, Ceylon.

DYES AND TANS. :—The most important product obtained from this tree is catechu. It is obtained by boiling heart-wood with water. There are two varieties of this product.—1 Kath or pale catechu and 2 Cutch or dark catechu. One ton of heart-wood yields about 250-300 lbs. of cutch. As sold in Bazar Kath is found in irregular pieces or small square blocks of greyish colour, which on breaking show crystalline fracture. In Bombay a variety of Cutch is prepared from the nuts of this plant. In some of the older trees a third substance called *Khairsal* is met with, sometimes in the form of white powder or crystalline deposit in the cavities of wood. It is chiefly used for medicinal purposes. Cutch does not hold a high position as a tanning material as the leather produced is harsh and apt to contain yellow stains. The chief industrial use of the cutch is in dyeing cotton, silk and in Calico-printing. At the present day it is probably used to a larger extent in printing than in dyeing. It produces very fast steam browns and drabs; in madder dyed style it produces brown in combination with red, chocolate and purple. The use of cutch in dyeing Khaki, and for colouring pulp and paper are suggested. The use of cutch in the dyeing of ship's sails is said to be based on its excellent fastness and its preservative action preventing sea-water from rotting cotton. It is the most valuable dye agent India possesses.

Cutch and Kath are also being prepared in an up-to-date factory in U. P. The principle is the same but all the operations are carried out by machinery.

## ACACIA CONCINNA DC.

FAM. :—Mimosaceæ.

COM. NS.—*E.* Soap-pod tree; *G.* Chikakai; *H.* Kochi, Ritha, *K.* Manda-otte, Shige, Sige-balli or kai; *M.* Shikekai; *Sk.* Bhuriphena, Charmakusha, Dipta, Phena, Saptata, Vidula.

**SECTION 8.**
**Dyes and Tans.**

CHAR. :—An extensive woody climber, branches dotted with white lenticels and armed with hooked prickles; *L.* bipinnate, 5-10 cm. long; rachis armed with hooked prickles and with glands; pinnae 4-6 pairs with rachis ending in spine; leaflets 10-20 pairs, overlapping; *Fl.*—In fascicled globose heads, yellow; *Fr.*—pod, 7·5-12·5 × 2-2·8 cm., linear-oblong, fleshy when green, wrinkled when dry; *Sd.*—6-10; *Fl. t.*—Mar.—July.

DISTR.: —Throughout India, Malay Islands, China.

DYES AND TANS. :—The bark is used for dyeing and tanning fishing nets in South India.

## ACACIA FRANESIANA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Cassie Flower, Spongy Tree, Stinking Acacia; *G.* Gandhelokhair, Jheribavul; *H.* Passibabal, Vilayati Kikar; *K.* Jali, Karejali; *M.* Devababhul, Kankri.

CHAR. :—A thorny shrub or a low tree, 6-7·5 m. high; girth 3-6 m. *Bark* light brown, rough, *Branches* slender, zigzag, marked with grey or pale-brown dots, *Spines* stipular, straight. Common petiole 4-5 cm. *L.*—2-pinnate, 2·5-5 cm. long, pinnæ 4-8 pairs; cup-shaped glands below the lowest and often at the base of the uppermost pair; leaflets 10-20 pairs. *Fl.*—bright-yellow, sweet-scented, in globose fasciculate heads. *Fr.*—pod, nearly cylindric, 5-9 cm., turgid, brown, slightly curved, pointed at the ends, dehiscent, glabrous, valves with raised parallel lines. Seeds embedded in dry spongy tissue. *Fl. t.*—Jan.-Mar. *Fr. t.*—in rainy season.

DISTR. :—Cosmopolitan in the tropics, but usually cultivated. Run wild near villages and in moist situations throughout the State; common in the eastern parts and in black-soil *nalas* of the Deccan, Sind.

DYES AND TANS. :—The bark gives an inky dye. It yields a tanning material not much used in India. The pods are occasionally used as a dye-stuff. Ripe pods contain 23% of tannin.

*See* Medicinal Plants, Gums & Resins, Oils.

## ACACIA LEUCOPHLEA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*E.* White-barked Acacia; *G.* Haribaval; *H.* Thind, Karir, Nimber, Safed-Kika; *K.* Bili-Jali, Naibela, Topal; *M.* Hivar.

CHAR. :—A moderate-sized or large deciduous tree, 7·5-15 m. high, girth 1·2-1·8 m. In dry places is reduced to a small bushy tree. *Bark* thick, pale yellowish-white and smooth when young; dark-brown, almost black and rough when old; exfoliating in patches and strips. Branchlets, leaves, petioles and branches of inflorescence grey-downy. *Spines* ·6-2·5 cm., stipular, straight. Petiole with several cup shaped glands. *L.* pinnæ 12·24, 2·5-4 cm. long; leaflets 30-60, rigid, coriaceous, obliquely oblong obtuse. *Fl.*—small pale-yellowish, nearly white, in globose heads, not more than ·6 cm. diam., disposed in terminal leafless, about 30 cm. long, panicles; peduncles short with 2 bracts. *Fr.*—pod, 10-20 × ·6-·8 cm., sessile, slightly twisted, clothed with pale-brown or grey tomentum. Seeds 8-12. *Fl. t.*—Aug.-Nov. (sometimes as early as May). *Fr. t.*—Apr.

DISTR. :—Throughout the dry Deccan districts; common in the Southern Maratha Country and Sholapur, in dry open forests, plains of the Punjab and U. Pradesh; Ceylon and Burma.

DYES AND TANS. :—The leaves and bark are used in dyeing and give a black colour. Bark is used for tanning. It has been found that the tannin contents vary with the locality from which the bark is obtained. Bark is used for dyeing in Burma and gives a red colour, but mixed with other barks gives black.

*See* Fibres, Famine Plants, Gums and Resins.

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## ACACIA INTSIA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Chilar.

CHAR. :—A large climbing shrub, armed with small hooked prickles. *L.* 2-pinnate; pinnæ 5-10 pairs; leaflets 10-25 pairs, linear oblong, very unequal-sided, green above, pale beneath. *Fl.* White or Yellowish-white in terminal panicles; heads globose. *Pods* flat, thin.

DISTR. :—Common throughout the state from the coast inland in deciduous forests; Tropical Himalayas, E. & D. Peninsulas, Ceylon.

DYES AND TANS. :—The bark or the fresh leaves of the plant are said to be used as an auxiliary in dyeing with morinda or lac giving brightness,

## ACACIA SUMA, Kurze.

FAM.—Mimosaceæ.

SECTION 3.

Dyes and Tans.

COM. NS. :—*K.* Banni-mara, Mugali; *M.* Sone-khair (Kamtia).

CHAR. :—A small tree with downy branchlets, 4·5 m. high; girth ·9-1·2 m. *Bark* white or greenish-white, smooth, peeling off in small papery flakes and marked at intervals by horizontal patches of darker colour. Spines twin, short-hooked, infra-petiolar. *L.*—rachis 7·5 cm. long, with a large cup-shaped, over gland at the base and several smaller ones between several of the upper pinnæ; pinnæ 20-40, 4-5 cm. long; leaflets 60-100, approximate, rigid, pale-green, pubescent. *Fl.*—pale-yellow, almost white in axillary 1-4-nate, 7·5-10 cm. long spikes. *Fl.*—May-Aug. *Fr. t.*—Sept.-Oct.

DISTR. :—In N. Kanara near the Dharwar frontier and in the Southern Maratha Country, usually in moist places, along *nalas,* not common. Bengal, Bihar, W. Peninsula, Ceylon.

DYES & TANS. :—The bark is peeled off and used as a tan.

## ACACIA SUNDRA DC.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Black or Pegu Catechu, Catechi, Cutch; *G.* Kher, Khairiobavel; *H.* Katha, Khair, Khair-babul; *K.* Kachu Kaggali, Kaggali-shami, Tare; *M.* Khair, Lal-Khair.

CHAR. :—A moderate-sized tree, trunk short, 9-12 m. high; girth 1·2-3 m. *Bark* dark-grey or greyish-brown exfoliating in long narrow strips. Spines short, hooked, twin, brown, infrapetiolar. *L*—rachis glabrous about 15 cm. long, often with scattered prickles and a gland below the insertion of the pinnæ and smaller ones between several of the upper pinnæ. Pinnæ 15-20, leaflets 40-80, very close, ligulate. *Fl.*—pale-yellow in solitary or fascicled, axillary, 7·5-10 cm. long spikes. Petals linear, glabrous, three times longer than the glabrous calyx. *Fr.*—legume, stipitate. strap-shaped, brown, 5-7·5×1·3-2 cm. 3-10 seeded. *Fl. t.*—Aug.-Sept. *Fr. t.*—Dec.

DISTR. :—Dry open thorn-forests. Common throughout the State along the coasts of Konkan and N. Kanara (often on laterite) Deccan. Khandesh-Akrani, S. M. Country and Gujarat, Rajasthan, W. Peninsula, Himalayas up to 1,700 m., Sikkim : Pegu, Burma, Ceylon.

SECTION 3.
—
Dyes and Tans.

DYES AND TANS. :—Same as *Acacia catechu.* The red *cutch* is considerably sold in Bombay Market under the name of *Red-ebony.* The Chief source of the wood seems to be the Baria State in Gujarat.

*See* Medicinal Plants.

## ACHRAS ZAPOTA, Linn.

(Achras Sapota Linn).

FAM.—Sapotaceæ.

COM. NS. :—*E.* Sapodilla-plum ; *H.* Sapota ; *K.* Chukuhannu ; *M.* Chiku.

CHAR. :—A moderate-sized tree, 9-12 m. high ; (15-18 m. high in America) ; girth ·9-1·2 m. Young shoots covered with tawny tomentum. *L.*—·5-7·5 cm., lanceolate-acuminate, obtuse or almost retuse, entire, glabrous, approximated near the ends of the branches ; petiole 1·3-2·5 cm. *Fl.*—6 merous, whitish, scentless, on solitary axillary pedicels, 1·3-2·5 cm. Calyx tawny-tomentose. Corolla slightly longer than the calyx. *Fr.*—berry, globose or oblong, when ripe covered with a brown, scabrous rind. Seeds 1-3 covered with yellowish tawny sweet pulp. *Fl. t.*—all the year round. *Fr. t.*—more profuse from Oct.-Apr.

DISTR. :—Cultivated for fruits ; grows well near the sea coast ; largely cultivated in districts of Kolaba, Thana, and South Gujarat and Saurashtra ; on small scale in the Deccan, Khandesh and various parts of India. Native of Tropical America.

DYES & TANS. :—The bark contains about 11·8% of tannin and is used by fishermen of South Luzon for colouring ship's sails and fishing tackles.

*See* Fruit Trees.

## ADENANTHERA PAVONNA, Linn.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Red Wood ; *G.* Bari-gumchi ; *K.* Manjadi, Manjuti ; *M.* Val, Mothi Gunja, Thorli Gunja.

CHAR. :—A deciduous unarmed tree, 15-18 m. high, girth 1·2-1·8 m. *Bark*:grey. L.—abruptly bipinnate, 30-60 cm. long ; pinnæ 4-6 pair, opposite, short peduncled, 10-20 cm. long ; leaflets 4-12 pairs, oblong, alternate, 1·5-3·75 cm. long on very short petiolules. *Fl.*—small, yellow, faintly fragrant, in short-peduncled racemes, 5-15 cm. long, simple from the axils of the leaves and panicled at the end of the branches. *Fr.*—pod, 15-23 × 1·3 cm. twisted, 10-12 seeded. Seeds scarlet red, shining, convex on both sides. *Fl. t.*—Mar.-May. *Fr. t.*—Aug.-Oct.

DISTR. :—Wild and planted. In the moist forests of Konkan and N. Kanara, nowhere abundant; Gujarat, Khandesh, S. India, Bengal, Sikkim, Burma.

DYES and TANS. :—Wood gives a red dye.

*See* Oils, Gums and Resins.

## ADHATODA VASICA, Nees.

FAM.—Acanthaceæ.

COM. NS. :—*G.* Adsoge, Aduso, Ardusi; *H.* Adalso, Arusho, Vasaka; *K.* Adsala, Adumuttada, Adusoge; *M.* Adulsa, Adusa, Vasuka; *Sk.* Amalaka, Atursta, Sinhika, Vasaka.

CHAR. :—A dense shrub 1·2-2·4 m. high, with opposite ascending branches; *L.*—12-20 by 4-6 cm., elliptic lanceolate, dark green above, paler beneath; *Fl.*—in axillary spikes towards the ends of the branches; C.—tubular, white, with a few rose-coloured bars in the throat; *Fr.*—capsule, clavate, bluntly pointed, orbicular, oblong, tubercular-verrucose; *Fl. t.*—Aug-Nov.

DISTR. :—Tropical India from the Punjab and Assam to Ceylon, Malaya, S. E. Asia.

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DYES AND TANS. :—A yellow dye is obtained from the leaves, by boiling. It is used for dyeing coarse cloth.

*See* Oils, Fodder Plants.

## AEGICERAS CORNICULATUM, Blanco.

**(Aegiceras majus Gaertn.).**

FAM.—Myrsinaceæ.

COM. NS. :—*H.* Halsi, *M.* Kajla, Phangli.

CHAR. :—A small handsome tree with milky juice. *L.*—Laurel like obovate, blunt, smooth. *Fl.*—White, fragrant. *Fr.*—Small, curved, sharply pointed, reddish-brown.

DISTR. :—Common in the mangrove swamps and tidal creeks. Konkan, Kanara; both sides of the Deccan Peninsula; Sundribans; Burma, The Andaman Islands, Ceylon.

SECTION 3.
—
Dyes and Tans.

DYES and TANS. :—The bark, which contains about 6·6% of tannin is sometimes used for tanning. It, however, yields leather of poor quality.

## AEGLE MARMELOS, Corr.

FAM.—Rutaceæ.

COM. NS. :—*E.* The Bael tree, Bengal Quince ; *H.* Bel. Bili ; *K.* Bela, Baelpatri, Bilapatri ; *M.* Bel.

CHAR. :—A small or moderate-sized tree, armed with axillary, straight, strong thorns 2·6 cm. long, 9-12 m. high and girth about ·9-1·2 m. *Bark* 1·34 cm. thick, light cinerous grey, soft, corky, exfoliating in irregular flakes. *L.*—3 foliolate, alternate. Leaflets 3 (very rarely 5), oblong or broadly ovate-lanceolate, acute or obtusely acuminate, crenulate, membranous, inconspicuously pellucid-punctate, the lateral ones smaller and almost sessile, the terminal one much larger, 5·2-5·9 × 3·6 cm., long-petiolulcd. *Fl.*—3·2 cm. diam., greenish-white, sweet-scented, on long slender, pubescent pedicels, forming axillary puberulous racemes. Calyx pubescent, deciduous. Petals oblong, coriaceous, thickly dotted, imbricate. Stamens numerous (30-40). Filaments distinct, subulate, inserted round a small disc. Anthers linear-oblong. Ovary ovoid, 8-20 celled ; cells near the circumference. Style short ; stigma capitate or oblong, woolly, imbedded in a thick, sweet, aromatic, orange-coloured pulp. *Fl. t.*—about May. *Fr. t.*—rainy-season. Sheds leaves-Mar.—Apr. new foliage at the end of hot season. A specimen with 7 and 9 leaflets has been observed in one of the houses in the City of Poona.

DISTR. :—Wild in Gujarat and the Deccan, Konkan ; throughout India in dry places, wild or cultivated ; often cultivated near temples ; Sub-Himalayan tract from the Jhelum eastwards ; Burma.

DYES & TANS. :—A yellow dye is obtained from the rind of the fruits. The unripe rind is used along with myrabolans in calico-printing.

*See* Medicinal Plants, Oils, Gums and Resins, Fodder Plants.

## ALBIZZIA LEBBAK, Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Parrot or Siris or Sizzling tree ; *G.* Kalsadasado, Kalo or Piloshirish ; *H.* Gars, Kalshish, Sirai, Tantia ; *K.* Dodde or Hombage, Sirisa ; *M.* Chinchola, Kalashirish, Shirish ; *Tr.* Kokko, CHAR. :—A tall unarmed deciduous tree, 9-12 m. high; girth 1·8-3 m. *Bark* brownish-grey, rough with numerous short irregular cracks. *L.*—common petiole 7·5-30 cm., glabrous or downy, with a large gland near the base. Pinnæ 4-8 with or without one or more glands between the lowest; leaflets 8-18, unequal-sided, rigid, glabrous or pubescent, obtuse, 2·5-4 cm. *Fl.*—white, fragrant, glabrous or downy, larger than in the last species. Heads many-flowered, on peduncles 3-4 together, arising from the uppermost axils. *Fr.—legume*, 20-30 × 2-4 cm., firm, yellow-brown, thin, 6-12 seeded. *Fl. t.*—Apr.—June. *Fr. t.*—Aug.-Sept. New leaves Mar.-Apr.

DISTR. :—Dry and moist monsoon forests; throughout the State; commonly planted along roadside, throughout India, usually planted; sub-Himalayan region from the Indus eastwards, Bengal; Burma, Ceylon, Tropical Asia and Africa.

DYES and TANS. :—The bark which contains 7·11% of tannin is said to be used for tanning leather. It is used in Madras to tan fishing nets.

*See* Medicinal Plants, Oils, Fodder Plants Sacred Plants.

## ALBIZZIA PROCERA, Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E.* White-Siris; *H.* Garso, Gurbari, Karanji, Karo, Safed-Siris; *K.* Bellati, Chikul, Salaindi; *M.* Gurar, Kinhai; *Tr.* White-Siris.

CHAR. :—A large deciduous unarmed tree, 18-24 m. high (in favourable places 30 m.); girth 1·8-2·7·m. or more. *Bark* 1·3 cm. thick, yellowish or greenish white or grey, smooth, with horizontal lines. Tender leaves downy. *L.*—common petiole 15-30 cm. with a large, brown, oblong gland near the base. Pinnæ 4·12; leaflets 12-24, short-petioled, sub-coriaceous, rigid, obtuse, 2·5-4 cm., obliquely truncate at the base. *Fl.*—yellowish-white, borne on peduncles 2·5 cm. long in fascicles of 2-5, arranged into more or less ample terminal panicles. *Fr.*—Legume, 15-23 × 2-2·5 cm., thin, reddish-brown, dehiscent, 8-12 seeded. *Fl. t.*—May-June. *Fr. t.*—Jan.-Feb.

DISTR. :—Throughout the State; common in the N. Kanara and the Konkan moist forests, in the dry districts along ravines and *nalas*, central and eastern Himalayas, Western Peninsula; Burma, Malay Archipelago.

DYES and TANS. :—The bark is sometimes uesd for tanning.

*See* Gums & Resins.

## ALEURITES MOLUCCANA Willd.

FAM.—Euphorbiaceæ.

SECTION 3.

Dyes and Tans.

COM. NS. :—*E.* Belgaum Walnut, Candle Nut tree.

CHAR. :—A handsome ornamental evergreen tree, 12-18 m. high, girth 1·5-1·8 m. Young shoots covered with a brownish stellate tomentum. *L.*—10-20 × 7·5-15 cm., collected at the ends of branches, ovate-lanceolate, acute or acuminate, often 3-5 lobed and covered with a brownish or whitish tomentum when young and glabrous when old, cordate or obtuse at the base with 2 glands at the insertion of the petiole. *Fl.*—numerous, rather small, white, on large terminal panicles; male flowers usually at the ends of the branches of the panicles; female flowers sessile in the divisions of the panicles. Calyx both of male and female flowers pubescent or tomentose. Styles 2·2-cleft. *Fr.*—drupe, 2·5-5 cm. diam., fleshy, a little compressed, olive-coloured, containing 2 or by abortion a single hard 1-seeded nut. *Fl. t.*—Apr.-May. *Fr. t.*—rainy season; fruits ripen next cold season.

DISTR. :—Planted in gardens throughout the State; indigenous in the Malaya Archipelago.

DYES and TANS. :—The bark is reported to contain tannin. Root of the tree affords a brown dye which is used in Sandwich Islands for dyeing their native clothes.

*See* Oils, Gums & Resins.

## ALPINIA GALANGA Willd.

FAM.—Zingiberaceæ.

COM. NS. :—*M.* Kulinjan.

CHAR. :—A herb, rootstock perennial, tuberous, slightly aromatic. *L.*—large, oblong-lanceolate, green with slightly white margins. *Fl.*—greenish-white in dense-flowered panicles; the lip obovate, clawed, white veined with red. *Fr.*—size of a small cherry, orange-red.

DISTR. :—Konkan, N. Kanara; throughout India, often cultivated; Ceylon, Malay Islands.

DYES and TANS. :—Root-stock is used in calico printing only with myrabolans in N. W. Provinces.

## ALTHEA ROSEA Cav.

FAM. :—Malvaceæ.

COM NS. :—*E.*—Holly-hock.

CHAR. :—A villous ornamental herb about 1·8 m. high. *L.*—long petioled, cordate-ovate, acutely 5-7 lobed. *Fl.*—Fairly large with very short stalks, with purple, rose, yellow or white colours, in terminal racemes.

DISTR. :—Cultivated as an ornamental plant in the gardens all over the state and India. Native of Crete and Greece.

Dyes and Tans. :—Its flowers yield a red dye (anthocyamin) which may be used as an indicator in acidimetry or alkalimetry.

### ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cashew Apple or Nut; *G.* Kaju; *H.* Kaju; *K.* Gerubi, Godambe, Kampu; *M.* Kaju.

CHAR. :—A small evergreen tree with a short thick trunk, 7·5-9 m. high, girth ·6-·9 m. *Bark* thick, rough, grey-coloured. *L.*—coriaceous, 10-15 × 3·8-7·5 cm., obovate or elliptic, rounded at the apex, shining above. *Fl.*—in terminal panicles with cymose branching, yellow with pink stripes. Corolla petals linear lanceolate, deflexed. *Fr.*—nut, reniform, 2·5 cm. long, bark-coloured on a pyriform yellow, orange or red-coloured fleshy peduncle. *Fl. t.*—Jan-Mar. *Fr. t.*—Mar.-April.

DISTR. :—Introduced from S. America, Naturalised throughout the State; very common near the seashore in open situations in Konkan and N. Kanara, especially in sandy places and often gregarious; along the coast forests of India and Ceylon; also cultivated.

DYES and TANS. :—The bark contains 9% tannin and may be used for tanning. The pericarp gives an oil called cardole used in Andamans to tan or colour fishing nets so as to preserve them. This oil is called *Dik* in Goa where it is much used as a tar for boats and nets. The milky sap of the bark turns black on exposure to air and is used as an indelible marking ink.

*See* Medicinal Plants, Oils, Gums and Resins, Fruit Trees.

### ANOGEISSUS LATIFOLIA Wall.

FAM.—Combretaceæ.

COM. NS. :—*E.* Button tree; *G.* Dabria, Damora, Dhavda; *H.* Bakla, Dhava, Dohu; *K.* Bejjalu, Dindala, Dindiga; *M.* Dhavda; *Tr.* Axle-wood.

CHAR.:—A large erect deciduous tree, 9-15 m. (sometimes 24 m.) high; girth 1·8-2·7 m. *Bark* smooth, light coloured, with shallow irregular depressions caused by exfoliations. Branchlets and young leaves with soft, silky or rusty pubescence. *L.*—5-13 cm. on petiole, coriaceous, ovate, or broad-elliptic, obtuse, retuse or emarginate. *Fl.*—heads in axillary racemes; peduncles one or more from the same axil, often branched. *Fr.*—very small, 2-winged, prickly, glabrous. Seed solitary. *Fl. t.*—May-July. *Fr. t.*—Nov.-Feb. Leafless during the whole of the cold season; new leaves in Apr.-May.

**SECTION 3.**
**Dyes and Tans.**

DISTR. :—Very common throughout the State usually in dry deciduous forests. Throughout the greater part of India; Ceylon.

DYES & TANS. :—The leaves and twigs are tanniferous. The leaves have been known and used locally for many years under the name of *dhawade sumac*. The mature leaves contain about 32-33% of tannin. The leaves have to be dried in shade but fermentation sets in rapidly resulting in loss of tannin. The sun-dried leaves contain about 16% of tannin. The dry reddish tops of young leaves have been found to contain upto 55% of tannin. Experiments have shown that a mixture of green leaves, red leaves and leaf-stalks, when dried and coarsely ground to pass through a 10 mesh sieve, yields a product containing 30% of tannin. The tannin penetratesrapidly and produces a satisfactory pale leather with a greenish tinge but the leather becomes sensitive to light. Due to the difficulty in collecting young red leaves and drying them within the short period available before the setting of monsoon, the cost increases. Due to this, there is not much demand in the foreign market. It is therefore, a tan-stuff excellently suited for village tannaries.

The dry bark contains 10-15% of tannin and in combination with *tarwad* (Cassia auriculata) gives good results.

*See* Medicinal Plants, Gums and Resins, Fodder Plants.

## ARTOCARPUS INTEGRA (Thumb.) Merril.

**(Artocarpus integrifolia Linn).**

FAM.—Moraceæ.

COM. NS. :—*E.* Jack-fruit Tree, Jack or Orange Wood; *G.* Vanas; *H.* Chakki, Kanthal, Ranos; *K.* Halasu, Kujja, Panesa, Tage; *M.* Phanas; *Tr.*—Jack.

CHAR. :—A large evergreen tree, 12-18 m. high; girth 1·3-3 m. (sometimes more). Glabrous except the youngest parts. *Bark* thick, blackish, deeply cleft when old. *L.*—10-20 cm. long, coriaceous, elliptic, entire (in young plants sometimes lobed), dark-green and shining above, rough beneath, stipules large, *Fl.*— monoecious densely crowded on globose one-sexual solitary, axillary receptacles; male receptacle cylindric without bracteoles; female attaining enormous size, 30-75 cm., tubercled; hanging on short stalks from the trunk; anthocarps, pyramidal. Seeds oblong or reniform, starchy, size of a nutmeg. *Fl. t.*—Nov.-Jan. *Fr. t.*—ripe June-Aug.

DISTR. :—Rain forests of Western Ghats, Konkan, often planted along roadsides in N. Kanara; planted near villages in the State; grown in gardens also; widely cultivated.

DYES and TANS. :—The wood or its saw-dust, yields on boiling a decoction used as a yellow dye. The Buddhist priests use this with alum to dye their robes yellow. It is found that the Artocarpus dye is moderately fast on silk. With indigo it gives green colour. In Midnapur a red dye for home use is produced by boiling the juice of green fruits with Ak root and lime. Yellow dye is obtained from the roots in Sumatra.

*See* Medicinal Plants, Fruit Trees, Gums and Resins, Fibres, Fodder Plants.

## ARTOCARPUS LAKOOCHA Roxb.

FAM.—Moraceæ.

COM. NS. :—*H.* Barhat, Dahu, Dhau, Lakucj ; *K.* Wonta, Watchuli ; *M.* Badhar, Wotomba ; *Tr.*—Lakooch.

CHAR. :—A large deciduous tree, 12-18 m. high; girth 1·8-3 m. *Bark*—rather thick, dark grey, rough. Branchlets and under side of leaves downy. *L.*—15-25 × 5-15 cm., oval or ovate or oblong-ovate, obtuse or short-acuminate, coriaceous, glabrous and shining above and soft tomentose below. *Fl.*—Aments of both sexes on very short peduncles, axillary and solitary, the male generally on the lower axila, irregularly roundish or oblong, yellow, size of a nutmeg; female on the upper axils. *Fr.*—size of a man's fist, sometimes larger, soft-pubescent, yellow when ripe. *Fl. t.*—Mar.-Apr. *Fr. t.*—July-Aug.

DISTR. :—Evergreen forests of the Konkan and N. Kanara, common in the forests near Yellapur; tropical Himalayas from Kumaon eastwards to Burma and southwards to Travancore.

DYES and TANS. :—Like the preceding species.

The roots of this species are richer in colouring matter than those of other Artocarpus Spp.

*See* Fibres, Fruit Trees(w), Fodder Plants.

## AVERRHOA CARAMBOLA Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*E.* Carambola Apple, Coromandel, Gooseberry; *G.* Kamrakh ; *H.* Kamrak, Kamrang ; *K.* Kirahulli, Darchulli ; *M.* Kamarakh, Karmare.

CHAR. :—A small tree with close drooping branches. *Bark* grey with horizontal folds. *L.*—alternate, imparipinnate leaflets 5-11, irritable to the touch, 4-6·5 × 2-3·2 cm., ovate-oblong, acuminate, entire, glabrous or pubescent above, glaucous and glabrous beneath, base oblique, acute. *Fl.*—in short racemes, chiefly axillary or sometimes springing from the bark. Sepals glabrous. Petals more than twice as long as the sepals, oblong-obovate, variegated white and purple. Stamens 10, of which 5 are shorter and without anthers, or sometimes 1 or 2 of these longer and antheriferous; filaments dilated at the base. *Fr.*—oblong, acutely angled, yellow. Seeds arillate. *Fl. t.*—May-Aug. *Fr. t.*—cold season.

DISTR. :—Cultivated throughout the State; run wild in some of the forests near villages in N. Kanara; cultivated in many parts of India and the Tropics. Perhaps a native of Malaya.

DYES and TANS. :—The unripe fruits are used as a mordant in dyeing.

*See* Medicinal Plants, Fruit Trees.

## AVICENNIA OFFICINALIS Linn.

FAM.—Verbenaceæ.

COM. NS. :—*E.* White Mangrove; *K.* Ipati; *M.* Tiwar.

CHAR. :—A small tree. *Bark*—thin, greyish-brown. *L.*—4-7·5 cm., elliptic-lanceolate, obovate-acuminate, tapering into a petiole 3-5 lin, coriaceous, entire, glabrous above, clothed with a white minute tomentum beneath. *Fl.*—Yellow, fragrant, sessile small, in terminal heads. Calyx lobes 5, corolla segments 4. *Fr.*—capsule, ovate, compound, acuminate, 2-valved, 1-seeded, seed usually germinating on the tree. *Fl. t.*—Apr.-Jun. *Fr. t.*—July-Aug.

DISTR. :—Common in the salt marshes, and along the banks of tidal rivers and creeks, throughout the Konkan and N. Kanara. Mangrove Swamps of the Deccan Paninsula and India, Ceylon, Burma, Andamans and Nicobar.

DYES and TANS. :—The bark which contains about 2·5% of tannin is used as a tanning agent.

## BARRINGTONIA ACUTANGULA Gaertn.

FAM.—Lecythidaceæ.

COM. NS. :—*E.* Small Indian Oak; *G.* Samudraphala; *H.* Hijgal Panniari, Samudraphal; *K.* Kolekanva, Mavinkumbia; *M.* Ingli, Niwar, Samudraphal, Tiwar.

CHAR. :—A small evergreen tree 10-15 m. high; girth 1·2-1·5 m. *Bark.*—1·3 cm. thick, dark brown, rough, glabrous, *L.*—7·5-13 × 5 cm., short-petioled, cuneate-elliptic or obovate-oblong, entire or serrulate coriaceous, occasionally pubescent. *Fl.*—pink, smaller than in B. *racemosa*, arranged in long often about 30 cm. long, pendulous racemes at the ends of the branches, sometimes downy. *Calyx* 4-cornered, the limb 4-lobed. Corolla-petals 4, pink, Stamen filaments many, long red. *Fr.*-2·5-4 × 1·3 cm., oblong, 4-angled, angles rounded *Fl t.*—Apr.-May. *Fr. t.*—Oct.-Nov.

DISTR. :—In swampy places. Banks of rivers and streams throughout N. Kanara and Konkan. Common near the coast, througout India. Ceylon, Malaya, N. Australia.

DYES and TANS. :—The bark contains 10% of tannin. It is used as a tan in Burma.

*See* Medicinal Plants, Poisonous Plants, Fish Poisons, Fodder Plants.

## BASELLA RUBRA Linn.

FAM.—Basellaceæ.

COM. NS. :—*E.* Indian spinach, Malabar night-shade; *G.* Pothinivel, Valchi bhaji; *H.* Poi, Mayalki bhaji, Lalbachala; *K.* Kempubasale; *M.* Mayalu, Velbondi; *Sk.* Kalambi, Pichhila, Putika, Vrischikapriya.

CHAR. :—A perennial herb, stem very long, slender, twining to the right, succulent; *L.* 15-12·5 ×2·5-7·5 cm., variable, broadly ovate, thick, entire, base cordate; *Fl.*—white or red, sessile, few, in lax pedunculate spikes, perianth fleshy 5-fid, segments elliptic obtuse; *Fr.*—size of a pea, red, white or black.

DISTR. :—Throughout India wild or cultivated; tropical Asia and Africa.

DYES and TANS. :—The colouring matter of the red variety is reported to have been used in China as a dye for official seals as well as for rouge. It can serve for colouring jellies. The addition of a little lime-juice brightens the colour. The ripen fruits of some races contain a deep violet colouring matter which is some times used for colouring food.

*See* Vegetables.

## BAUHINIA PURPUREA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*H.* Kandan, Kaniar, Khaiswal, Sona; *K.* Sarul, Kanchivala; *M.* Devakanchan, Raktakanchan.

CHAR. :—A moderate-sized, evergreen, usually bushy tree, 6-9 m. high, branches stout, glabrescent. *Bark*—ash-coloured to dark-brown. *L.*—10-12·5 cm. broad, roundish, about as long as broad, divided 1/3-1/2 the way down into 2 obtuse lobes, glabrous above, faintly hairy beneath, base cordate, petioles 2·5-4 cm. long. *Fl.*—fragrant, in terminal and axillary few-flowered corymbose racemes, buds fusiform, pubescent. Calyx pubescent, tube slightly dilated upwards; limb about 2·2 cm., splitting into 2 segments slightly divided at the apex into 3 short teeth. Corolla petals 4·5 × 1·3 cm., oblanceolate, acute, with a long claw, white, rose or purple. Fertile stamens 3 to 4; filaments as long as the petals. *Fr.*—pod, 15-30 × 2 cm., sub-woody, flat, pointed at both ends; seeds 12-16, oblong-ellipsoid, compressed, brown *Fl. t.*—Sept.—Nov. *Fr. t.*—Jan.—Apr.

DISTR. :—Cultivated throughout the State in gardens. Wild in dry forests of the Deccan and Konkan (Talbot and Woodrow). Sub-Himalayan tract from the Ravi eastwards extending to 1,500 m., Southern India, Madhya Bharat, Bengal; Burma.

DYES and TANS. :—The bark is said to be used for dyeing and tanning.

*See* Gums & Resins, Fibres, Fodder Plants.

## BAUHINIA VAHLLI W. & A

FAM.—Cæsalpiniaceæ.

COM. NS. :—*H.* Maljan; *M.* Chambul.

CHAR. :—A gigantic climber with large leaves, divided not far down but deeply cordate. *Fl.*—large, white. *Pods* very long, thin, rusty, hairy.

DISTR. :—Common in some parts of Konkan and ghats.

DYES and TANS. :—The stem contains 8% of tannin. It produces a tan which penetrates hides quickly and produces a soft, pale, cream coloured leather. The tannin is present in the cementing material between the fibres.

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*See* Fodder Plants.

## BAUHINIA VARIEGATA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*G.* Kovidar; *H.* Kachnar, Kaniar Pedrian; *K.* Arisiganlinga, Kangivala, Utipe; *M.* Kanchan.

CHAR. :—A medium-sized deciduous tree, young shoots brown and pubescent. *Bark*—grey with vertical cracks. 10-15 cm. long and as broad, cleft 1/4 to 1/3 into two obtuse lobes, base deeply cordate. *Fl.*—in racemes, large, fragrant, white or purplish. Corolla petals 5, 6·3 cm. long, clavate with broad claws all white or 4 purple and fifth darker. *Fr.*—Pod, 15-20 × 1·8-2·5 cm., flat, dehiscent. Seeds 10-15, *Fl. t.*—Feb.-Apr. *Fr. t.*—Nov.

DISTR. :—Cultivated throughout the State, often as a road-side tree; not indigenous; sub-Himalayan tract and outer Himalayas of the Punjab from the Indus eastwards, Kumaon, Sikkim, Burma, China.

DYES and TANS. :—The bark is used in dyeing and tanning. It is used in dyeing to obtain various fast shades of brown.

*See* Medicinal Plants, Gums and Resins, Fodder Plants.

### BIXA ORELLANA Linn.

FAM.—Bixaceæ

COM. NS. :—*H.* Latkan, Watkan; *K.* Kuppamankal, Rangamali; *M.* Kesari, Shendri.

CHAR. :—A small evergreen tree with cordate leaves on long petioles. *Fl.*—pale purple or white in terminal panicles. *Fr.*—capsule, prickly.

DISTR. :—Largely cultivated throughout India.

DYES and TANS. :—The *Annatto* dye of commerce is obtained from the pulp (aril) surrounding the seeds of Bixa. The fruits are collected when nearly ripe; as the shells dry they burst open, when the seeds with the pulp are taken out. For extracting the dye these seeds are first bruised and the pulp macerated with hot water in wooden vessels and soaked in it for a number of days till the colouring matter forms a fine suspension. The seeds are then removed and the remainder which contains the pigment is allowed to ferment for a week or so. The dye that settles at the bottom is separated and pressed into cakes, the form in which they are generally exported. The yield is 4·8 – 6% by weight of the seeds. The dye is also prepared by boiling seeds with sodium carbonate solution, filtering and acidifying the filtrate. The dye is coagulated by boiling with common salt, after which it is filter pressed, washed and dried.

*Annatto* produced in S. America is marketed in the forms of cakes, tablets, or as a paste. Solutions of the dye have also been introduced in the trade. Bixin ($C^{25}H^{30}O^{4}$) is the principal colouring matter present in the seeds.

The dye was once used for colouring silk and cotton. It gives a beautiful pink colour to silk cloth and when mixed with *Kamala* powder can be turned into a vivid orange. The dye is however very fugitive.

On account of its non-toxic nature, it is now chiefly used for colouring edible materials such as butter, ghee, cheese, margarine, chocolate. Milkmen sometimes use it to colour the buffalo-milk to pass it off as cow's milk. The colouring of *Vanaspati* (hydrogenated vegetable oil) by *Annatto* may serve to distinguish it from ghee. Recipes have been worked out for using it in floor-polishes, shoe-polishes, hair-oils,etc. The dye is sometimes used locally in Ceylon by the peasants for colouring cocoa beans.

The bulk of *Annatto,* used in the dairy-industry. in India,. is imported from America.

## BRIDELIA RETUSA Spreng.

FAM. :—Euphorbiaceæ.

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Dyes and Tans.

COM. NS. :—*G.* Asana, Ekalkanto, Manj; *H.* Gauli, Kaj, Kassijkhana; *K.* Asana, Garige, Goge, Havugandha, Hssinage, Mullu or Siru Honne; *M.* Asana, Gunjan Patharphoda.

CHAR. :—A moderate-sized deciduous tree, 9-15 m. high; girth 1·5 – 1·8 m. *Bark*—grey or brown, rough with longitudinal cracks and exfoliating in long irregular plates. *Branches* occasionally spinescent when young; young shoots and underside of leaves usually pubescent or tomentose; *L.*—7·5 – 15 × 9 cm., elliptic-oblong or elliptic-obvate, obtusely pointed, retuse or emarginate at the apex, rounded or slightly cordate at the base, entire or slightly crenulated, coriaceous, glabrous above, glaucous or more or less hairy beneath. *Fl.*—greenish-yellow, monoecious on very short pubescent pedicles, numerous, in solitary axillary clusters, or forming spikes in the axils of the leaves and often panicled at the end of the branchlets. Petals of male flowers on long claws; disc. 5-lobed. *Fr.*— a berry, globular, size of a pea, succulent, black when ripe. *Fl. t.*—May-Oct. *Fr. t.*—Oct.-Jan. Sheds leaves Mar.-Apr.; new foilage May-June.

DISTR. :—Throughout the hotter parts of India in deciduous monsoon forests; tolerably common in the Konkan and the Deccan hills; along the base of the Himalayas from Kashmir to Mishmi, and southwards to Ceylon.

DYES and TANS. :—The bark is used for tanning. It contains from 16 to 40 % of tannin.

*See* Medicinal Plants, Fruit Trees(w).

## BRIDELIA STIPULARIS Blume.

FAM. :—Euphorbiaceæ.

COM. NS. :—*K.* Bisal bali, Bislu-hannu; *M.* Phaterphod.

CHAR. :—A large climber sometimes with aerial roots; branches with deflexed long spines. *L.*—elliptic-oblong, margins crenate; *Fl.*—Monoecious, greenish yellow, in long spikes; *Fr.*—Small, ellipsoid, black when ripe.

DISTR. :—Common in the deciduous forests throughout the state; throughout India; Ceylon, Malay Islands, Philippines, Tropical Africa.

DYES and TANS. :—Same as the preceding. Fruit yield a black colouring matter.

*See* Sacred Plants.

## BRUGUIERA CONJUGATA (Linn.) Merril.

## (BRUGUIERA GYMNORHIZA Lamk.)

FAM.—Rhizophoraceæ.

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**Dyes and Tans.**

CHAR. :—A glabrous evergreen tree, 9-12 m. high, 1·5 – 2·4 m. *Bark*—rough, dark with large corky lenticular patches. *L.*—shortly oblong-elliptic, or oblong-lanceolate, 7·5 – 15 × 4 – 6·5 cm., coriaceous, on a thick petiole 2·5 cm. long. *Fl.*—red, about 2·5 cm. diam., on short, thick drooping peduncles, shorter than the petioles; solitary in the axils of the leaves. Calyx tubes almost campanulate; limb 10-14 cleft; the segments 6-8 lin., stiff. Corolla petals 10-14, densely hairy at the base, 2-lobed, with 2-4 bristles on each lobe and one in the sinus between the lobes. *Fr.*—oblong, drooping, crowned at first with the stiff calyx lobes; germinating radicle cylindric smoothish. *Fl. t.*—Dec.-Mar.

DISTR. :—Common along sea-coast, creeks, tidal rivers and salt-marshes. Coasts of the Peninsula, Sundribans; Indian archipelago, Sind, Burma N. Australia.

DYES and TANS. :—It is valuable tanniferous mangrove plant. Its bark may be utilised for the preparation of tannin extract. The air-dried bark, from smaller trees, yields an extract containing about 62% of tannin, while that from the large trees yield an extract containing about 72% of tannin. The tannin is of the catechual class. The leather produced by direct tanning is of a reddish or orange buff colour, fairly stout, and suitable for sole leather. On account of the high percentage of non-tannins, the leaves are not suited to the manufacture of extract. They may be used directly in tanning. They have been found to produce a soft, supple, fawn-coloured leather.

## BUCHANANIA LANZAN Spreng.

## (Buchanania latifolia Roxb.).

FAM. :—Anacardiaceæ.

COM. NS. :—*G.* Charoli; *H.* Char, Paira, Piyal; *K.* Charpoppu, Kolegaru, Murukali; *M.* Char, Charoli, Pyalchar.

CHAR. :—A moderate-sized deciduous tree; trunk straight, 12-14 m. high, 1·2 m. *Bark*—2·5 cm. thick, dark-grey, sometimes nearly black, rough, tessellated with regular "boss"-like prominence. *L.*—15·25 × 6·3-12·5 cm., rounded or obtuse at the tip, coriaceous, firm, entire, 15-20 pairs of prominent nerves, villous or pubescent, glabrate beneath, on a flattened, stout, pubescent petiole. *Fl.*—numerous, greenish-white small, sessile or on very short-pedicels, forming terminal and ancillary, woolly or velvety, much-branched panicles. Calyx small, 5-toothed. Corolla petals oblong. Disc fleshy, 10-lobed. Stamens 10. Ovary only 1 fertile, conical, hairy; the remaining 4 reduced, to staminodes. *Fr.*—drupe, compressed, smooth, sub-globose, black when ripe 1·3 cm. Nut hard, bony, 2-valved. *Fl. t.*—Jan.-Mar. *Fr. t.*—Apr.-May. Sheds leaves in hot season.

DISTR. :—In dry and open forests throughout India, Konkan, Deccan, Dangs, Gujarat S. M. Country, Burma, Cambodia, Indo-China, Siam.

DYES and TANS. :—The bark is used in tanning. It contains about 13% of tannin. It gives leather dark reddish-brown colour; it is somewhat stiff and harsh in texture.

*See* Medicinal Plants, Oils, Gums & Resins, Fodder Plants, Fruit Trees(w).

## BUTEA MONOSPERMA (Lam.) Kuntz.

FAM. :—Papilionaceæ.

COM. NS. :—*E.* Bastard Teak, Bengal Kino Tree, Flame of the Forest; *G.* Khakda, Khakaro; *H.* Chinchra, Dhak, Kakria; *K.* Muttala, Kuttugga; *M.* Palas, Paras.

CHAR. :—A moderate-sized deciduous tree; 12-15 m. high, girth 1·8-3 m. *Bark*—fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissure a red juice, which hardens into gum. Young parts covered with grey or brown silky pubescence. *L.*—pinnately-trifoliolate, in petiole 7·5-15 cm. long. Leaflets 10-15 × 7·5-11·7 cm., coriaceous, hard, glabrescent above, hoary beneath; two lateral ones oblique-ovate; the terminal one roundish, obtuse, often emarginate at the apex, rhomboid at the base, larger, as long as broad in the middle. *Fl.*—large, bright orange-red, or thickly brown pubescent pedicels, arranged in tomentose, terminal and axillary racemes 15 cm. long. Calyx 1·3 cm. silky inside. Corolla-petals equal, densely clothed on external side with silky pubescence; standard broad; keel-acute, incurved. *Fr.*—legume, pendulous, tomentose, 6-8 × 4-5·5. Seed oval, flat, brown. *Fl. t.*—Feb.-Mar. *Fr. t.*—June-July. Sheds leaves in cold season; new leaves in Apr.

DISTR. :—Throughout the State, common in deciduous forests of Konkan, Deccan, Khandesh; throughout India from the Himalayas to Ceylon and Burma, usually in open grassy savannahs where it is often gregarious.

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DYES & TANS. :—The dried flowers yield a brilliant yellow dye which is extensively used for colouring Indian Saris. When used by itself it is not very permanent. The addition of alum, lime or an alkali deepens the colour to orange and also makes it rather fast.

*See* Medicinal Plants, Oils, Gums & Resins, Fibres, Fodder Plants, Sacred Plants.

### BUTEA SUPERBA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Velkhakar; *K.* Balli or mat tanga; *M.* Palasvel.

CHAR. :—A gigantic climber; stem as thick as a man's leg. *L.*—three foliate terminal leaflet large. *Fl.*—bright-orange, large.

DISTR. :—Forests of North Konkan, Kanara.

DYES and TANS. :—Root is said to yield a red dye in Burma.

*See* Fodder Plants.

### CAESALPINIA CORIARIA Willd.

FAM. :—Caesalpinaceæ.

COM. NS. :—*E.* American Sumach; *K.* Divi-Divi, Vilayati-Yaldekayi; *M.* Divi-Divi.

CHAR. :—A small spreading tree. Stem without prickles. *Bark*—dark reddish-brown, thin, finely fissured vertically. *L.*—with 6-8 pairs of pinnae. Pinnae with many small leaflets, 25-30 pairs approaching those of an acacia in general appearance. *Fl.*—small, light yellow or green, in short dense panicles. *Fr.*—pod, 5-7·5 × 2 cm., ·3 cm. thick, twisted, fleshy, smooth, pale to blackish- brown in colour. Flowering and fruiting occur twice a year Jan.-Feb. and June-July.

DISTR. :—Cultivated in Dharwar, Belgaum and Kanara in the Bombay State; planted on the road-sides. Native of South America and West Indies; introduced into India and now almost acclimatized in S. India.

DYES and TANS. :—The tree yields *divi-divi* pods of commerce. The tree begins to bear in the fifth year and attains full bearing capacity in the twentieth year. The pods are collected carefully as they drop from the tree, dried and stored. When exposed to moisture they are liable to damage. A mature tree yields about 300 lbs. of pods per year.

The pods are rich in tannin, containing from 28-41 % tannin. The tannin in pods is located in the tissue close to the outer skin. It can be easily leached out from the pods. Divi-Divi has the advantage due to its percentage of tannin and the ease with which it can be

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extracted. A powder rich in tannin (60%) is obtained from bruised pods. On account of their high sugar content *divi-divi* liquors ferment rapidly resulting in loss of tannin and development of an objectionable red colour. This can be checked by the use of antiseptics. The tan liquor yields leather which is strongly affected by climatic conditions. In wet climate leather becomes soft and spongy and in drought it lacks pliability. It is usually employed in combination with other tan-stuffs. It is also used in the drum tannage of light leather which is of light yellow colour. It is also used in the textile industry as a mordant. It is the cheapest of the South Indian tanning materials. The world's supply of *divi-divi* comes chiefly from Colombia, Venezuela, Jamaica and to a certain extent from India. Before the first world war, Germany was the chief market and since then U. S. A. has occupied the premier position. Tanners in United Kingdom are prepared to use greater quantities of these pods and would welcome increased supplies. Under the circumstances, cultivation of trees over large areas can be recommended as the product would find a ready market.

## CAESALPINIA SAPPAN Linn.

FAM. :—Cæsalpinaceæ.

COM. NS. :—*E.* Sappan-wood tree ; *G.* Bakam ; *H.* Bakam, Patanga ; *M.* Patang.

CHAR. :—A small tree, 6-9 m. high; stem prickly, 15-23 cm. in diameter, branches rufous hairy, armed with a few small prickles. *L.*—20-37 cm. long, pinnae 8-12 pairs, 10-15 cm. long, subessile, with small prickles at the base. Leaflets 10-18 pairs, subessile, oblong, rounded at the apex, attached at the lowest corner, very inequilateral (upper side much the largest), glabrous above, hairy beneath. *Fl.*—in panicles which are terminal and in the axils of upper leaves, 30-40 cm. long. Calyx leathery. Corolla 2 cm. across. Petals orbicular, yellow, subequal, upper with a red spot at the base. Stamens waxy white ; filaments densly wooly at the base. *Fr.*—pod, 7·5-10 × 4-5 cm. woody, obliquely oblong, polished, indehiscent, with a hard recurved short beak at the upper angle of the obtuse apex. Seeds 3-4. *Fl. t.*—Sept.-Oct.

DISTR. :—Often planted in gardens in Bombay and the Deccan, South India, Bengal, Burma.

DYES and TANS. :—Wood yields a valuable red dye known commercially as *Brazilin*. The colour is extracted from the wood in the following manner :—

The wood is first cut into chips, crushed into powder and extracted twice with hot water. The extract, which is deep orange in colour is allowed to ferment before use. The wood extract is used in calico-printing. It produces steam-reds and pinks. Aluminium acetate or

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stannic-oxalate is used as mordant in combination with an oxidising agent – Potassium chlorate or Copper sulphate. With cotton fabrics it produces bright orange shade when mordanted by tannin-alum. In combination with indigo purpule-shades are obtained. Wool and silk can be dyed using alum as mordant but the shades obtained are not fast. Sappan-wood is used with alum to communicate to starch one of red colours – the *gulal* or red powder used in festivals.

The pod cases (about 40% tannin) and the bark contain tannin. These in combination with iron have been used in dyeing to obtain black shades.

The tree is found in scattered condition in the State and in India. It is rather doubtful whether the supply of wood from India will be able to compete with raw products from Brazil.

*See* Oils.

### CAESALPINIA SEPIARIA Roxb.

FAM. :—Caesalpinaceæ.

COM. NS. :—*E.* Mysore thorn ; *K.* Hotsige ; *M.* Chillar, Chillari.

CHAR. :—A scandent shrub with curved thorns. *L.*—with 6-10 pairs of pinnae and 8-12 pairs of leaflets. *Fl.*—in large erect racemes, small, coloured. *Pod* linear with a long abrupt point.

DISTR. :—Found in hedges (it forms an impenetrable fence) in dry districts of the State. Very common in S. M. country. From the Himalayas to Burma and Ceylon.

DYES and TANS. :—The bark is used for tanning in Konkan.

*See* Oils.

### CAREYA ARBOREA Roxb.

FAM. :—Lecythidaceæ.

COM. NS. :—*E.* Wild Guava ; *G.* Kumbi ; *H.* Kumbhi, Vakambi ; *K.* Daddala, Gavahannu, Hennumatti ; *M.* Kumbha.

CHAR. :—A glabrous middle-sized or sometimes a large deciduous tree, 9-18 m. high ; girth 1·5-2·4 m. *Bark*—thick, rough, dark-grey ; inner bark red, fibrous. Wholly glabrous. *L.*—15-30 × 10-15 cm., oblong, obovate or orbicular, membranous, sessile or very short-petioled, crenate, denticulate, obtuse or shortly acute. *Fl.*—5-6·5 cm. diam., white with purple filaments, subtended by 3 unequal bracts arranged in short spikes, with an unpleasant smell. Calyx campanulate. *Fr.*—6·5 × 5 cm., globose, and crowned with the persistent calyx-tube. *Fl. t.*—Mar.-Apr. *Fr. t.*—May-July. Sheds leaves during early part of hot season and is soon covered with new leaves (Mar.-Apr.). Leaves turn red in cold season.

DISTR. :—Very common throughout India and the State in monsoon forests; also in valleys and ravines throughout the drier areas. Common in S. Konkan and Western Ghats; Ceylon, Malayan Peninsula, Siam.

DYES and TANS. :—Leaves contain 10 % of tannin. Bark is used in tanning and also in dyeing.

*See* Medicinal Plants, Fibres, Gums & Resins, Fruit Trees (w), Fodder Plants.

## CARISSA SPINARUM Linn.

FAM. :—Apocynaceæ.

COM. NS. :—*H.* Karaunda.

CHAR. :—A small thorny evergreen shrub resembling the last species except that it is slightly hairy and sometimes assumes prostrate form.

DISTR. :—Dry hills of the Deccan. Common in Dharwar and Belgaum districts on dry stony ground; wild in most parts of India in the drier zones from the Himalayas to Ceylon.

DYES and TANS. :—Leaves are fairly rich in tannin (9 to 15%). Though the tannin percentage is low it has the advantage that the leaves can be collected all the year round. Tannage is slow causing extreme swelling of the hides and if care is not taken drawing of the grain takes place. Very satisfactory results are however obtained in combination with other stuffs such as twig-bark of Avala.

*See* Fruit trees (w).

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## CARTHAMUS TINCTORIUS Linn.

FAM. :—Compositæ.

COM. NS. :—*E.* Safflower; *G.* Kusumbo; *H.* Kusumba; *K.* Kusumba; *M.* Kardai.

CHAR. :—An annual thistle like herb. *L.*—alternate, rigid, spinescent. *Fl.*—hermaphrodite, yellow; involucre sub-globose bracts many seriate; receptacle flat, densely bristly. *Fr.*—obovid, angular; pericarp white. This variety is perticularly grown for oil purposes.

DISTR. :—Cultivated in the State. The cultivation is mostly confined to the south-east portions of the Deccan and the Karnatak, occupying about 4,16,298 acres.

DYES and TANS. :—The spineless form of the plant is used for extracting dye.

The florets contain two colouring matters – Carthamine which is scarlet-red, insoluable in water and safflower-yellow which is soluble in water.

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For extracting the dye the florets are carefully collected and dried in shade and then repeatedly washed with acidulated water till all soluble colouring matter is eliminated. The washing takes 3-4 days. The residue is particularly dried and moulded into small cakes, for market. In some places the dried florets are rolled together as a fibrous mass or made into loose powder and sold in the market. Safflower carmina of commerce is extracted from the washed material. It is sold as a paste and is used for dyeing cotton and silk. It imparts red, pink, rose, crimson and scarlet shades as desired. It is a weak dye and fades when exposed to light and air. Red, pink and crimson hue is at once turned yellow by a single drop of alkali. The fabrics therefore should not be washed with soap. It is valued in India for dyeing cloth on ceremonial occassions. The dye is also used in colouring eatables such as cakes and biscuits. It is used in the preparation of *rouge* with starch and talc. The dry carthamine precipitate mixed with finely pulverized talc constitute *rouge-vegetable*. It is also used for colouring toys.

Safflower carmine was exported in large quantities, before the war, especially from Bengal to Eastern countries.

The flowers are sometimes fraudulently mixed with saffron which they resemble in colour.

The importance of this plant as a dye crop has declined due to the advent of synthetic dye-stuffs coming in the market.

*See* Medicinal Plants, Food Plants, Oils, Vegetables.

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## CASSIA AURICULATA Linn.

FAM. :–Cæsalpinioideæ.

COM. NS. :–*E.* Tanner's cassia ; *G.* Awal ; *H.* Taroda, Tarwad ; *K.* Avarike, Sakusina, Tangadi ; *M.* Tarwad ; *Sk.* Avartki, Charmaranga, Mayahari, Pitakilaka.

CHAR. :–A tall much branched evergreen shrub ; *Bark*–smooth, reddish brown ; *L.*–7·5 × 10 cm. long, rachis densely pubescent, a linear gland between each pair of leaflets ; stipules very large, rotundate, reniform ; leaflets 8-12 pairs, slightly over-lapping, oblong-obovate, mucronate, dull green above, pale beneath. *Fl.*–large yellow with orange veins, 5 cm. across, in terminal and axillary corymbose racemes. *Fr.*–pod, 20-25 cm., obliquely sepate. *Sd.*–30-35, rhombohedral. *Fl. t.* Jan.-July.

DISTR. :–Dry regions of Rajputana ; Madhya Pradesh and W. Peninsula, Ceylon, Burma.

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DYES and TANS. :—The bark is the principle indigenous tanbark. When the plants are two to three years old the branches and twigs are cut off and dried in small cornets. The yield is about 1400 lbs. of green bark per acre (from 3,600 plants) after 4 years. Plants grown on soil rich with lime are richer in tannin. The product usually employed in factories contains on an average 18 % of tannin. Extracts prepared from bark are too dark for use. The use of bark is preferred to the use of extract in tanning as the extract produces leather which is hard and dark. Leather tanned by unstripped twigs also gives good results. The size of the twigs from which the bark is taken is more important than the age of the plant. Twigs thicker than a lead-pencil which have not developed corky kind of bark appear to be the best. Avaram tannin — as it is called — penetrates the hide quickly and produces a light coloured leather with elastic grain and good tensile strength. The leather developes an objectionable brick-red colour on exposure to light; this is rectified by giving tanned leather a final bath in myrabolan extract. This bark is used largely in South Indian Tannaries. It has got a fame as a tanning material for *crust* tanning. The hides exported from Madras are generally crust tanned and they are further treated and then considered as finished products for market.

*See* Fibres, Famine Plants.

## CASSIA FISTULA Linn.

FAM. :—Cæsalpiniaceæ.

COM. NS. :—*E.* Golden Shower, Indian Laburnum, Pudding Pipe or Stick; *G.* Bala, Garmala; *H.* Amaltas, Bandartauri; *K.* Aragina, Kakka, Konde; *M.* Bahava.

CHAR. :—A moderate sized deciduous tree, 9-15 m. high, girth 9-1·8 m. *Bark*—greenish-grey, compact, smooth when young, reddish brown and rough in old trees exfoliating in many-sided patches. *L.*—pinnate, 30-45 cm. long; leaflets 4-8 pairs, ovate or ovate-oblong, 5-13 cm. long, on petioles 2-3 lin. long, acuminate, thin. *Fl.*—large, showy, yellow, on slender pedicels, 4-5 cm. long, arranged in drooping racemes, ·3-·6 m. long, from the axils of the new leaves or from above the scars of fallen ones. Calyx of 5 nearly equal, velvety, deciduous lobes. Corolla petals obovate-oblong, nearly equal, about 2·5 cm. long. Stamens unequal, the 3 lowest, longest, incurved, 1-3 very short. *Fr.*—pod, cylindrical, pendulous, ·6-·9 m. long, dark-brown, smooth, indehiscent, divided into numerous one-seeded chambers by thin transverse partitions. Seeds ovoid, somewhat compressed, brownish, enveloped in a soft black pulp. *Fl. t.*—Mar.-May. *Fr. t.*—cold season.

DISTR. :—Throughout mixed monsoon forests in the Deccan, Konkan and Khandesh Akrani. Planted as ornamental and roadside tree throughout India, Ceylon, Malaya.

**SECTION 3.**

**Dyes and Tans.**

DYES and TANS. :—The bark is used in tanning along with terminalia barks; it is used in admixture with *tarwad* bark in the tanning of East Indian Kips. The bark produces a smooth grained leather but not so much as obtained by the use of *tarwad* bark. The colour is pale. The twig-bark gives much better colour than the bole-bark. Tannin content usually ranges from 10-12%. It is a favourite tanning material among the tanners of S. India; about 200 tons of bark are collected from the forests in South India. A light-red dye is obtained from the bark, with alum as a mordant; the colour is deepened by the use of pomegranate rind. The wood-ash is used as a mordant in dyeing.

*See* Medicinal Plants, Gums & Resins, Fodder Plants, Sacred Plants.

## CASIA TORA Linn.

FAM. :—Cæsalpiniaceæ.

COM. NS. :—*E.* Foetid cassia : *H.* Chakunda, Pamad, Panevar; *K.* Chagoche, Tagache, Taragosi; *M.* Takala, Tarota; *Sk.* Chakramarda, Dadamari, Taga, Dadrughna.

CHAR. :—An annual foetid herb, 30-90 cm. high. *L.*—pinnate, 7·5-10 cm. long, rachis grooved, with a conical gland between each of the 2 lowest pairs of leaflets; leaflets 3 pairs, opposite (lowest smaller), obovate, oblong, base oblique. *Fl.*—in pairs in the axils of leaves. *C.*—petals 5, pale yellow, upper petal 2-lobed. *Fr.*—pod, 12·5-20 cm. × 4·5 mm. much curved when young, obliquely septate. *Sd.*—25-50 rhombohedral. *Fl. t.*—after the rains.

DISTR. :—Ceylon and the tropics generally.

DYES and TANS. :—Seeds are used as a blue dye along with indigo. The use of cassia seeds with indigo dye seems worthy of chemical examination.

*See* Famine Plants, Sacred Plants.

## CASUARINA EQUISETIFOLIA Forst.

FAM. :—Casuarinaceæ.

COM. NS. :—*E.* Beef-wood tree. *K.* Chaviku, Gali; *M.* Khadshemi, Suru.

CHAR. :—A large evergreen tree, 15-18 m. high; girth 1·2-2·4 m. *Bark*—brown, rough, fibrous, peeling off in vertical strips. Glabrous, with leafless, drooping branches terminated by whorles, articulate, thin, slender deciduous branchlets. *Male fl.*—monandrous, in terminal cylindric catkins, about 1·3 cm.; *Female fl.*—in small pedicellate, globose heads, with conspicuous subulate teeth. *Fr.*—a globular oblong cone, of the size of a cherry, formed of the enlarged woody bracts and bracteoles, containnig samaroid caryoposis with a membranous wing. *Fl. t.*—Sept.-Oct. *Fr. t.*—ripe in June.

DISTR. :—East side of the Bay of Bengal; Chittagong southwards, Malaya Archipelago, Australia, cultivated elsewhere. There are large plantations of this tree in N. Kanara near the sea-coast. Also in gardens throughout the State.

DYES and TANS. :—The bark contains 6-18% of tannin and has been used in Madagascar for tanning purposes. It penetrates the hide quickly and furnishes a fairly plump, plaint and soft leather of pale reddish-brown colour. The bark contains a small quantity of colouring matter and produces in dyeing light-reddish drab colour. The shades produced by the dye-stuff are very good though faint. As the dye contents are very small it is not of great value in dye-house. It is used in Bombay as a mordant (*Lisboa*).

### CERIOPS TAGAL (Perr.) C. B. Robbins.

**(Ceriops Candolleana Arn.)**

FAM. :—Rhizophoraceæ.

COM. NS. :—*M*. Chauri, Kirrari.

CHAR. :—A small glabrous tree; branchlets marked with the scars of fallen leaves. *L.*—Coriaceous, obovate-oblong, rounded at the apex. *Fl.*—white in axillary cymes. *Fr.*—slightly conical, protruding radicle club-shaped, deeply grooved and angled, reddish-brown.

सत्यमेव जयते

DISTR. :—Tidal swamps along the coast of India; Konkan, Sind, Ceylon, Tropics of the Old-world.

DYES and TANS. :—Various parts of the plant are used in tanning industry. The tannin contents vary with the age and the habitat of the plant.

The leaves, which contain about 15% tannin, are suitable for direct application in the tanning industry and give a strong, supple, pinkish leather free from any crack of the grain. They can be used in combination with the bole-bark. The twig bark, which contains about 25% tannin, is suitable for the preparation of concentrated extracts. The bole-bark which contains about 41% of tannin, is highly valued in the tanning industry. Solid block extracts containing about 67% of tannin and crystal or powder extracts containing about 70% of tannin have been prepared and their suitability in tanning has been proved.

The extracts yield a hard brick-red leather. The tannin in the bole-bark extract is unstable. It has been suggested that the bark might be more useful as a dye than as a tanning material.

The red cutch (mangrove cutch) is obtained from the bark and the cortex and is used as such or along with indigo to give different shades of black, brown or purple. This cutch has been sapplanted by aniline dyes to a certain extent.

**SECTION 3.**
—
**Dyes and Tans.**

## CHROZOPHORA TINCTORIA A. Juss.

FAM. :—Euphorbiaceæ.

COM. NS. :—*E.* Turnsole.

CHAR. :—An annual prostate herb densely clothed with star-shaped hairs. *L.*—thick, hairy, ovate or rounded, toothed or entire. *Fl.*—Male and female in short racemes; males crowded at the apex, females solitary in the lower part, hairy. *Fr.*—Capsule hairy and silvery scaly. Seeds shining with silvery sheen.

DISTR. :—Wild in Deccan and Gujarat; Punjab, Afghanistan and Mediterranean region. Cultivated in South of France for the dye it yields.

DYES and TANS. :—The dye is called *turnsole.* It is obtained by grinding the herbs to a pulp in a mill when they yield a dark-green coloured juice, which turns faint purple by exposure to air or under the influence of ammonia. Dye principle occurs in all parts of the plant and is present during every stage of the growth and abounds in the cellular tissue occurring as colouring particles. It dyes without the aid of mordants a violet-red upon wool, silk or cotton tissues. There is no evidence of its being utilised in India. The plant might be grown at a small cost anywhere and the subject then seems well-worthy of attention, as there are many purposes to which it might be put in India.

## CHUKRASSIA TABULARIS A. Juss.

FAM. :—Meliaceæ.

COM. NS. :—*E.* Chittagong Wood; *K.* Dal-mara; *M.* Lal-devadari, Pabba; *Tr.* Chikrassy. (The name Golden Mahagony has been used in Burma).

CHAR. :—A large tree, 18-24 m. high; girth 2·4-3 m. *Bark*—reddish-brown, deeply cracked (Gamble); dark-coloured narrowly longitudinally fissured with short horizontal cracks and a scaly rhytidome, about ·67 cm. thick, inner bark 1·34 cm. thick, reddish, fibrous (Talbot). *L.*—31-47 cm. long, alternate. Leaflets 10-16, 5-13 × 3-7 cm., sub-opposite or alternate, obliquely ovate, unequal-sided, acuminate-cuspidate, nearly glabrous or more or less tomentose. *Fl.*—numerous, of a dirty-white or yellowish-white colour (sometimes red) on terminal axillary panicles which are shorter than the leaves.

Calyx 5-dentate. Petals 5, sparsely pilose. Staminal tube glabrous, and shortly 10-denticulated. Ovary 3-5-celled, hirsute. *Fr.*—capsule, nearly 5 cm. long, ovoid. *Fl.t.*—Jan.-Feb. *Fr. t.*—hot season.

DISTR. :—Both the varieties are common in the evergreen forests of N. Kanara and the Konkan (Tungar Hills and Roha). Western Peninsula from the Konkan southwards, Sikkim. Assam, Burma, Cocos Islands.

DYES and TANS. :—Young leaves contain 22% of tannin while bark contains 15% of tannin. Flowers yield a red and yellow dye.

## CICCA ACIDA Merr.

FAM. :—Euphorbiaceæ.

COM. NS. :—*K.* Kali-Kudai, Pan-nana.

CHAR. :—A much-branched, deciduous, dioecious, glabrous, tree; 9-12 m. high. *Bark*—white, smooth, exfoliating in irregular plates, disclosing patches covered with brown thick lines; inner bark with brown regular bands of fibrous tissue. *L.*—5-11·3 × 2·5-5 cm., oblong, elliptic-lanceolate, membranous, entire. *Fl.*—Male flowers small, numerous, fascicled, on pedicels 3-4 lin.; disc convex; female solitary or in threes on pedicels 4-5 lin. Styles 3, bi-fid at the apex. *Fr.*—capsule, globose, depressed, small, bluish. Seeds purple-blue. *Fl. t.*—Apr.-May. *Fr. t.*—May-June.

DISTR. :—On the Konkan and N. Kanara ghats in deciduous and evergreen forests. This is the "Pan-Nana" tree of some of the Belgaum evergreen forests. Western Peninsula; Ceylon.

DYES and TANS. :—The root-bark contains 10% of tannin. It is used for tanning to a limited extent especially in South India.

*See* Medicinal Plants, Fruit Trees.

## COMMELINA BENGHALENSIS Linn.

FAM. :—Commelinaceæ.

COM. NS. :—*H.* Kanshura; *M.* Kena.

CHAR. :—A creeping slender herb; branches diffuse. *L.*—Leaves with sheaths, ovate or oblong, hairy, base unequal sided. *Fl.*—blue, in funnel-shaped spathe, auricled on one side. *Fr.*—capsule, pyriform, seeds closely spotted; usually imperfect. From the lower nodes, sometimes leafless underground branches proceed bearing scapes containing white and small flowers producing capsules with large perfect seeds.

DISTR. :—All over the State; Throughout India; Ceylon, China, Tropical Asia and Africa.

**SECTION 3.**

**Dyes and Tans.**

DYES and TANS. :—The juice of the flower is used as a bluish pigment in painting upon transparencies (Smith).

### CURCUMA AROMATICA Salisb.

FAM.:—Zingiberaceæ.

COM. NS. :—*E.* Cochin-Wild turmeric, Yellow Zedoary ; *G.* Kapur-Kachali, Vanhaldara ; *H.* Banhaladi, Banharidra ; *M.* Ranhalad, Sholi ; *Sk.* Aranyaharidra, sholika, Vanarishta.

CHAR. :—Stemless herb ; root-stock large, palmately branched, sessile annulate, biennial ; tubers yellow and aromatic inside. *L.*—38-60 × 10-20 cm., oblong elliptic or lanceolate, green, variegated above, base deltoid. Fl.—flowring stem sheathed, appearing before leafing stem ; flowers fragrant, in spikes 15-30 cm. long, flowering bracts cymbiform, rounded at the tips, pale green, forming pouches for the flowers ; bracts of the coma tinged with red or pink ; *C.*—tube 2·5 cm. long, upper half funnel-shaped, lobes pale-rose, lateral lobes oblong, the dorsal longer ; lip yellow, 3-lobed. *Fl. t.*—May.

DISTR. :—Western Peninsula, Bengal ; sometimes cultivated.

DYES and TANS. :—It was formerly used in the preparation of the *Abir* powder. It gives a dirty colour, rarely used as a dye. Like turmeric its principal use is as a dyeing agent.

" The Native women prize it much from the circumstances that they can give with it, when used externally, a particular lively tinge to their naturally dark complexions and a delicious fragrance to their whole form " (Ainslie).

### CURCUMA LONGA Linn.

FAM. :—Zingiberaceæ.

COM. NS. :—*E.* Indian saffron, Turmeric ; *G.* Halada ; *H.* Halad ; *K.* Arishina ; *M.* Halad.

DISTR. :—The plant is cultivated all over India for the turmeric obtained from the rhizome. Extensively grown in the Deccan and Gujarat. Cultivated throughout the tropics.

DYES and TANS. :—It yield a yellow dye of fleeting character. Its chief features, that recommended it for decorative purposes at marriage ceremonies etc., were cheapness, ease of preparation, and facility of being easily removed.

For dye purposes a special form with harder roots and much richer in dye principle than the ordinary condiment form is grown. Though rich in colouring matter, its want of permanance, is a hinderance to its application as a dye material. Mordants are but rarely required with the dye as it is found to attach itself readily enough to wool, silk and cotton. Alkalies deepen the colour making it almost red. The pecularity of this dye is that it changes its colour depending upon the presence of alkali or acid and can therefore be used as a chemical indicator. Formerly the use of turmeric was almost exclusively limited to printing and dyeing silks. It is now employed to a vast extent in stuff-dying forming an important constituent in certain compound colours.

*See* Medicinal Plants, Condiments and Species.

### CURCUMA ZEDOARIA Ross.

FAM. :—Zingiberaceæ.

COM. NS. :—*E.* Zedoary ; *G.* Kachuri ; *H.* Hakhir ; *K.* Kachora ; M. Kachari, Kachora, Narakachora ; Sk. Gandhamulaka sara, Jatala, Karechura, Shathi.

CHAR. :—Stemless herb ; root-stock of palmately branched, cylindric, oblong, annulate tubers, pale-yellow inside ; odour like camphor, taste bitterish spicy ; *L.*—4-6 with long petioles, 30-60 cm. long, oblong-lanceolate, clouded with purple down the middle ; *Fl.*—flowering stem 20-25 cm. long, appearing before the leaves, clothed with sheaths ; flowers yellow in spikes, flowering bract green tinged with red ; coma-bract crimson or purple ; *C.*—funnel shaped, lobed ; lip 3-lobed, deep-yellow ; *Fr.*—capsule, 3- gonous.

DISTR. :—Cultivated more or less throughout India ; said to be wild in E. Himalayas and Chittagong.

DYES and TANS. :—The red powder *Abir* used by the Hindus at the Holi festival is often made from the rhizome of this plant.

*See* Oils, Food Plants.

### DIOSPYROS PEREGINA (Gaertn.) Gurke.

### (DIOSPYROS EMBRAYOPTERIS Pers.)

FAM. :—Ebenaceæ.

COM. NS. :—*E.* Riber Ebony, Wild Mangosteen ; *G.* Zeeberwo ; *H.* Gale, Kala-tendu, Makurkendi, Tendu ; *K.* Banda, Gavandu, Tumari, Tumaki-mara ; *M.* Temburni, Timbwini ; *Tr.* Ebony.

Char. :—A small evergreen tree, branches forming a dense shady head, 9-10·5 m. high, grith about 1·2 m. *Bark*—smooth, dark-grey, almost black, with a greenish tinge. Leaf bud silky with adpressed hairs. *L.*—13-20 × 5 cm., alternate, short-petioled coriaceous, smooth, shining, liner-oblong on thick wrinkled petioles. *Fl.*—white, fragrant, tetramerous ; male peduncles axillary, length of petiole drooping, 3-6 flowered, furnished with a small deciduous bract, anthers 40 on 20 filaments; female axillary, solitary, larger than the male, on short recurved pedicel. Staminodes 1-4. Ovary globular, hairy, 8-12-celled. Styles 4-6. Stigma branched, usually 2-3 fid. *Fr.*—4-5 cm. diam., globular, rusty-yellow when ripe, covered with a rusty, meal-like tomentum. Seeds usually 5-8, immersed in viscid glutinous pulp, reinform. *Fl. t.*—Mar.-May. *Fr. t.*—cold season.

DISTR. :—Near creeks and back-bays, along the coast of N. Kanara, and the Konkan; in the rain forests and river-beds in the ghat. Throughout India from the Himalayas to Ceylon. Common in Bengal, Siam, Malaya, Archipelago.

DYES and TANS. :—Unripe fruits are rich in tannin and are employed in tanning hides and dyeing cloth. By simply steeping the half-ripe fruits in water a brownish liquid is obtained which is sometimes used in dyeing a brown colour. The chief use as a dye is in what might be called the tanning of fishing nets and lines. It is more prized for the quality than as a colouring matter.

*See* Medicinal Plants, Oils, Gums & Resins, Fodder Plants.

## ECLIPTA ERECTA Linn.

FAM. :—Compositæ.

COM. NS. :—*G.* Bhangro, Dadhal, Kalobhangro; *H.* Balari, Bhangra, Mochand; *K.* Ajagara, Garagadasoppu, Kadigga-garaga; *M.* Bhangra, Maka; *Sk.* Bhringraj; Keshrangana, Markara, Pitripriya, Sunilaka.

CHAR. :—An annual erect or prostrate herb, often rooting at the nodes; stems and branches strigose and hairy; *L.*—opposite, sessile, usually oblong-lanceolate, subentire, strigose and hairy; *Fl.*—in heads, solitary or 2 together, axillary; involucral bracts about 8; ray flowers ligulate, disk ones tubular. *C.*—often 4-toothed; pappus 0. *Fr.*—achene, cuneate with a narrow wing; *Fl. t.*—Oct.-Dec. There are two forms *erect* and *prostrate.*

DISTR. :—India (Bengal, Madhya Bharat, Punjab, W. Peninsula), Burma, Sind, Ceylon, Malaya. Cosmopolitan in warm climate.

DYES and TANS. :—There is a popular opinion that the herb taken internally and applied externally will turn the hair black. The preparation obtained from the juice of the leaves, boiled with sesamum or coconut oil, when applied to hair turns the hair black and luxuriant. In tattooing, the natives, after puncturing the skin, rub the juicy green leaves of the plant over the part, which gives the desired colour — deep bluish-black.

*See* Sacred Plants.

## EMBLICA OFFICINALIS Gaertn.

FAM. :—Euphorbiaceæ.

SECTION 3.
—
Dyes and Tans.

COM. NS. :—*E.* Embelic Myrabolan Tree; *G.* Ambala, Amla, Bhoza; *H.* Amlika, Anala, Anward, Daula; *K.* Amalaka, Dadi, Dhatri, Nelikey; *M.* Avala..

CHAR. :—A small or middle-sized deciduous tree, 9-12 m. high; girth ·9-1·8 m. Trunk crooked, branches spreading. *Bark* thick, grey, exfoliating in small irregular patches or conchoidal flakes. *L.*—distichous, alternate, linear-oblong, sub-sessile, imbricate, on 10-12 cm. long branchlets having the appearance of pinnate leaves. *Fl.*—numerous, small, yellowish, on small slender pedicels on axillary fascicles or on the naked portion of the branch below the leaves. Calyx 6-parted, usually glabrous, glands 6, one between each of the segments. Staminal column slender, short, bearing 3-5 oblong anthers. Ovary 3-celled, glabrous. Styles 3, twice 2-cleft. *Fr.*—berry globose, about 2 cm. diam., fleshy, smooth, 6-striated, pale-yellow. *Fl. t.*—Mar.-May. *Fr. t.*—Oct.-Feb. (ripe). Leafless in hot season.

DISTR.—Throughout the State in deciduous forests. Wild and planted. Konkan, Western Ghats, Deccan. Throughout tropical and subtropical India, wild or planted; Ceylon, China, Malay Islands.

DYES and TANS. :—The bark, leaves and fruit all contain a good amount of tannin – stem-bark 8-9% twig-bark 21%, leaves 22%, and fruits 28%. The fruit contains two tannins – one giving on hydrolysis gallic acid, ellagic acid and glucose and other giving ellagic acid and glucose. The fruit is known as Embelic myrabolan and is used in tanning and dyeing. The dye is blackish-grey, but it is very rarely used alone, being generally employed to produce a black with salts of iron. It gives light brown shades when used alone. The bark and leaves are also used in dyeing – leaves give brownish yellow tinge to silk and wool fabrics. Fruits, leaves and bark are all used for tanning purposes, in various parts of the country, generally in combination with true myrabolans (Hirda). The twig-bark is of considerable value as a tanning material. It gives a brownish-red extract and produces a leather lacking somewhat in flexibility, but with a soft grain. In combination with the leaves of *Carissa spinarum* and of *Anogeissus latifolia,* the twig-bark gives a good leather with a reddish brown colour. For the production and collection of twig-bark on a commercial scale, coppicing is the system considered most suitable.

*See*—Medicinal Plants, Fruit Tree, Sacred Plants, Fodder Plants.

## ERYTHRINA VARIEGATA Linn. Var. Orientatis (Linn.) Merril.

FAM. :—Papilionaceæ.

SECTION 3.
—
Dyes and Tans.

COM. NS. :—*E.* Indian coral tree, Mochi-wood; *G.* Bangara, Panarvo, Panderoo; *H.* Dadap, Pangara, Pangira; *K.* Halivan, Hongara, Mullumuriga, Salaki; *M.* Pangara.

CHAR. :—A tall deciduous tree, armed with black prickles; petioles and leaves unarmed. *Bark* yellowish, smooth and shining, peeling off in thin papery flakes. *L.*—pinnately trifoliate, on petioles 10-15 cm. long. Leaflets broad-ovate, entire, short, acuminate, somewhat cordate at the base, membranous, glabrous; terminal leaflet 10-15 cm. long and broad, largest round cuspidate, truncate, or broad rhomboidal at the base. *Fl.*—bright scarlet, large, on pubescent pedicels, arranged in axillary or terminal racemes, 15 cm. long. Calyx 2·5-4 cm. long, spathaceous, with a very oblique mouth. 5-toothed at the top; standard 5-8·3 cm. long; the blade 2·5 cm. broad; wings and keel nearly equal. *Fr.*—legume, 15-30 cm. long, cuspidate, distinctly torulose, blackish; 1-8 oblong, red or purple seeds. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-July. Sheds leaves in cold season; new leaves in Mar.-Apr.

DISTR. :—In the deciduous forests of the Konkan and N. Kanara. Indigenous along sea-coast. Planted as support for pepper-vines, and for grape-vines in the Nasik district. Throughout India from Himalayas southwards, coast forests of Malabar; Pegu, Burma, Andamans and Nicobar, planted for ornament.

DYES and TAN. :—The dried red flowers on being boiled yield a red dye. The bark is said to be used in tanning and dyeing.

*See*—Medicinal Plants, Fibres, Gums & Resins, Fodder Plants.

## EUPHORBIA TIRUCALLI Linn.

FAM. :—Euphorbiaceæ.

COM. NS. :—*E.* Indian Tree Spurge, Milk-bush; *G.* Dandalio thor, Paradeshi thor; *H.* Sahud, Sondh, Shirthoar; *K.* Bottugalli, Kodu or Mondu-kalli; *M.* Nangya sher, Nevali sher.

CHAR. :—A small tree about 6 m. high; girth ·3-·6 m. *Bark* brown or greenish-brown. Branches spreading, cylindric, rush-like, smooth, green, almost leafless. *L.*—small, linear, 6-13 mm. long, appearing in rainy season. *Fl.*—involucres clustered in the forks of branchlets, mostly female, campanulate. *Fr.*—capsule, cocci velvety. Seeds ovoid, smooth. *Fl. t.*—Aug.-Sept.

DISTR. :—Naturalised throughout the dry districts of India and the State; cultivated as hedge plant all over: Native of E. Africa, Ceylon.

DYES and TANS. :—Ashes of the plant are employed in S. India as a mordant; they form an ingredient of the red dye with chay (Oldendandia) root.

*See*—Gums & Resins, Medicinal Plants, Poisonous Plants & Fish Poisons.

### FICUS GLOMERATA Roxb.

FAM. :—Urticaceæ.

COM. NS. :—*E.* Gular or Country Fig; *G.* Umar, Umro, Umbro; *H.* Demer, Gular, Lalka, Umar; *K.* Atti, Rumadi; *M.* Umbar.

CHAR. :—An evergreen tree, 15-18 m. high; girth 1·5-2·4 m. sometimes more in favourable circumstances. *Bark* thick, brownish-grey, rather smooth, scaly glabrous. *L.*—7·5-15 × 3·2-6·3 cm. alternate, ovate-oblong to lanceolate, entire, acute, smooth on both sides, pale beneath and covered with minute green dots. *Receptacles* large, size and shape of a common pear, purplish when ripe, arising in short paniculate clusters from the trunk and larger branches. *Fr. t.*—usually Mar.-July.

DISTR. :—Common throughout the State near villages, along roadside, and along the streams and rivers; common in Western ghats and Konkan, Deccan Peninsula. Salt Range and Rajasthan to the Khasia mountains; Burma, Ceylon.

DYES and TANS. :—Bark, under the name of *goolur* is mentioned as one of the ingredients used in preparing a good black dye (MaCann).

*See*—Medicinal Plants, Fodder Plants, Famine Plants, Sacred Plants.

### FLEMINGIA CONJESTA Roxb.

FAM. :—Papilionaceæ.

COM. NS. :—*H.* Bara-salpan, Supta; *M.* Daudaula.

CHAR. :—An erect shrub 1-2 m. high; young branches angular. *L.*—3-foliate, on long petioles; leaflets rather large, ovate-oblong, acute, dark green, sparingly silky beneath. *Fl.*—in dense axillary racemes; corolla standard white with pink streaks, wings purplish. *Fr.*—Pod, turgid finely hairy, with 2 seeds.

DISTR. :—Konkan; very common in the moist forests of N. Kanara; Bihar, Western Peninsula; Burma.

DYES and TANS. :—It yields a beautiful dye when applied to animal substances such as silk or wool; but it is inferior as a dye when used for purposes of colouring vegetable products such as cotton or linen. Pods are said to yield a red dye, called *Waras* locally.

## GARCINIA INDICA Chois.

FAM. :—Guttiferæ.

**SECTION 3.**
—
**Dyes and Tans**

COM. NS. :—*E.* Wild-mangosteen ; *G.* Kokam ; *H.* Kokum ; *K.* Murgal ; *M.* Bhirand, Ratamba, Kokamb.

CHAR. :—A tall slender tree with drooping branches. ***Bark*** light brown, spiny, very thin, smooth. *L.*—8·54-8·13 cm., obovate or lanceolate, obtuse, acute or acuminate, dark green, red when young. *Fl.*—yellowish. *Male* in axillary and terminal fascicles on pedicels 2·6-4 cm. Sepals orbicular. Petals rather larger. Stamens 12-20, forming a short capitate column ; anthers opening longitudinally. *Female* solitary and terminal on a thick peduncle. Staminodes arranged in 4 bundles. Ovary 4-8 celled ; stigma usually 8-lobed. *Fr.*—deep-purple, globose, as large as a small orange, not furrowed, 4-8-seeded. *Fl. t.*—Nov-Feb. *Fr. t.*—Apr.-May.

DISTR. :—Tropical rain forests ; Western coasts and W. ghats ; Matheran ; common in S. Konkan and N. Kanara evergreen forests. Often planted in the gardens in Konkan ; cultivated in Mauritius.

DYES and TANS. :—The juice of the fruit has long been employed as a mordant by dyers in South Western India. It is chiefly employed as a mordant with iron.

*See*—Medicinal Plants, Oils.

## GARCINIA MORELLA Desr.

FAM. :—Guttiferæ.

COM. NS. :—*E.* The Gamboge Tree. *K.* Arsina-gurgi, Hardala.

CHAR. :—A middling sized tree with spreading branches ; young branches quadrangular. *L.*—elliptic-obovate, narrowed at the base. Male flowers axillary in fascicles of 2-5 ; stamens many combined to form a central column. Female flowers axillary, solitary. *Fr.*—Small, subglobose.

DISTR. :—Kanara—evergreen forests ; Eastern Bengal, Khasia hills, Western Peninsula.

DYES and TANS :—The gum-resin is employed by the Burmese for dyeing silks of yellow colour. The rind of the fruit may be employed as a tan. Gamboge is employed by the Hindus in some parts of India as a pigment in making caste-marks on the forehead. In Europe it is largely used as a pigment, especially for water-colour drawings.

*See*—Gums & Resins.

## GARCINIA XANTHOCHYMUS Hook F.

FAM. :—Guttiferæ.

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COM. NS. :—*H.* Dampel; K. Divarige, Deavkai, Janagi; *M.* Jharambi.

CHAR. :—A medium sized beautiful evergreen tree 12-15 m. high, with girth of ·9-1·5 m. *Bark* brown, inner bark white, ·67 m. thick, without yellow glands, exfoliating in small round scales. Glabrous, trunk straight, branches drooping, sharply angled and often enlarged immediately below the axils of leaves. *L.*—23-47 × 5-10 cm., oblong- lanceolate, acute or shortly acuminate at the apex, more or less attenuated at the base, hardly coriaceous, shinning green, glabrous; petiole enlarged near the insertion on the stem. *Fl.*—white, with a very slight yellow tinge. *Male* and *hermaphrodite fl.*—2 cm. diam., in 4-8-flowered fascicles, from the axils of fallen leaves; sepals small, usually 5, orbicular, concave, unequal. Petals usually 5, larger, spreading. Stamens united in 5-phalanges of 3-5, alternating with 5-glands; no ovary. *Female fl.*—solitary in the axils of fallen leaves; ovary ovoid, 5-6-celled, crowned with a large, 5-6-lobed stigma. Fruit the size of an apple, subglobose or oval, yellow. Seeds 1-4; oblong. *Fl. t.*—hot season. *Fr. t.*—rainy season upto Jan.

DISTR. :—On the Bombay ghats; abundant in the evergreen forests of N. Kanara; Madras ghats. All over both the Peninsulas. Eastern Himalayas, Eastern Bengal, Burma, Penang and the Andaman Islands. Also cultivated in gardens.

DYES and TANS. :—The bark is employed in Assam for dyeing cotton. The dyeing property is doubtless due to the gum-resin it contains.

*See*—Gums & Resins.

## GARUGA PINNATA Roxb.

FAM. :—Burseraceæ.

COM. NS. :—*H.* Ghogar, Kaikar; *K.* Aranelli, Balagi, Khandergai, Nellagodda, Sodikonne; *M.* Kakad, Kangkar, Kudak, Kurak.

CHAR. :—A large deciduous tree; trunk strong, erect, 15-18 m. high, girth about 1·5-1·8 m. exfoliating in large irregularly shaped flakes. *L.*—about 31 cm. long or more, alternate, imparipinnate, near ends of branches. Leaflets 13-19, 5·2-10·4 × 2·6-3·2 cm., nearly opposite, lanceolate or ovate-lanceolate, acuminate at the apex, unequal at the base, subsessile, crenate, glabrous or tomentose. *Fl.*—Yellowish-white, in large compound pubescent panicles; bracts deciduous. Calyx teeth 5, ovate, pubescent. Petals 5, linear, inserted at the throat of the calyx, between its teeth. Stamens 10,

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filaments, ovary and style hairy, anthers versatile. *Fr.*—drupe, fleshy, smooth, size of gooseberry, containing 1-5 one-seeded nuts. *Fl. t.*—Feb.-May. *Fr. t.*—rainy season. Sheds leaves in cold season; new foliage early in hot season.

DISTR. —Common in the Konkan and the Deccan hills; throughout the dry forests of India from the Jammu to Burma and southwards to the Nilgiris; Andamans and Cocos Islands.

DYES and TANS. :—The bark is used for tanning in many parts of the country and is said to be good for that purpose by Kurz.

*See*—Gums & Resins, Fruit Trees(w), Fodder Plants.

## HAEMATOXYLON CAMPECHIANUM Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*E.* Logwood Tree; *K.* Partangi; *M.* Patangi.

CHAR. :—A small tree. *L.*—abruptly pinnate; leaflets small, obovate obcordate. *Fl.*—Yellow, fragrant, in thick axillary spikes. *Fr.*—Pod, small, one seeded.

DISTR. :—A native of Tropical America; grows successfully in Deccan; grown as a hedge plant.

DYES and TANS. :—The important part of the plant is the red heart wood which contains hæmatoxylin. A decoction of the chips of the heartwood as well as roots is used for dyeing violet and blue, certain shades of grey and more especially blacks, to which latter it gives a lustre and velvety cast. The dye is used in the manufacture of ink and in dyeing woollen and silk goods and for numerous other purposes.

The tree thrives well in hot and rather dry climate which is most suited for the development of the dye.

## HELIANTHUS ANNUUS Linn.

FAM. :—Compositæ.

COM. NS. :—*E.* Sun-flower; *G.* Surajmaki; *H.* Surajmukhi; *M.* Suryaphula.

CHAR. :—A large hairy shrub. *L.*—large whitish green. *Fl.*—heads large, ray florest, yellow. Seeds large.

DISTR. :—Common in gardens throughout the State; in gardens throughout India. Native of Western United States of America.

DYES and TANS. :—The blossoms yield a brilliant, lasting useful dye (Balfour). The petals are peculiarly rich in amorphous, resinous Xanthin — the base of the yellow pigment from which they derive the colour. The seeds contain helianthic acid which, when treated with hydrochloric acid in a current of hydrogen, is resolved into glucose and a violet dye.

*See*—Oils.

### HIBISCUS ROSA-SINENSIS Linn.

FAM. :—Malvaceæ.

COM. NS. :—*E.* Shoe flower; *G.* Jasuva; *H.* Jasum, Jasut; *K.* Dasavala, Dasanihu, Kempupundrika; *M.* Jasavand; *Sk.* Aruna, Harivallaba, Japapushpa, Raktapushpi, Rudrapushpa.

CHAR. :—A perennial shrub; *L.*—short petioled, ovate or ovate-lanceolate, irregularly serrate towards the top, entire near the base; glabrous. *Fl.*—axillary solitary, pedicel jointed above the middle; involucral bracts 5-7; *C.*—7·5; cm. diam., tubular below, red; petals thrice as long as the calys; staminal tube exerted far beyond the petals. *Fr.*—no fruits produced in India. *Fl. t.*—during most of the year. There are single and double forms with different colours shades of orange, yellow, crimson, bright red, magenta, etc.

DISTR. :—Cultivated in gardens throughout India. Native country probably China.

DYES and TANS. :—Flowers afford a red dye commonly used locally for colouring in cookery.

*See*—Fibres.

### INDIGOFARA TINCTORIA Linn.

FAM. :—Papilionaceæ.

COM. NS. :—*E.* Indigo plant; *G.* Guli, Nil; *H.* Nili; *M.* Nil.

CHAR. :—A small shrub, branches angular, silvery hairy. *L.*—imparipinnate; leaflets opposite, 9-13, oblong, glabrous above, hairy beneath. *Fl.*—Pink, numerous in lax racemes. *Fr.*—Pods with 8-12 seeds.

DISTR. :—Widely cultivated in many parts of India; wild as an escape. It was at one time cultivated extensively in Gujarat and Sind, for the dye.

DYES and TANS. :—A blue dye is obtained from the plant. To produce dye, green crop is placed in large masonry tanks and weighted down with planks. The whole is covered with water and is subjected to a process of fermentation and churning for 12 to 16 hours and stopped when leaves become pale in colour. The liquid is run-off in a second tank and is kept constantly agitated by human labour or mechanical contrivance for 2 to 3 hours, after which indigo

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settles at the bottom in the form of bluish mud. Water is then drained, and indigo collected in bags which are hung to dry. The partially dried stuff is cut into cubes of 3 in. square, stamped and further dried for export.

The plant requires a hot and moist climate and well drained friable soil. A good crop should yield about 12000 lbs. of green material per acre from the first cutting, giving 60 lbs. of dry indigo. About 35-40 lbs. of indigo-paste may be obtained from 1000 lbs. of green plants, and 500 lbs., of paste per acre is considered a good average annual yield.

The only producing countries, if any, are India and Java. Once a flourishing industry, it has now become practically ousted from the market by the aniline dyes, first introduced in 1880. During the first great war, however, indigo received a fresh impetus. This dye is considered to have certain advantages over aniline dyes, being softer and more permanent. This natural dye is used for the famous Persian rugs and carpets.

## LAGERSTROEMIA PARVIFLORA Linn.

FAM. :—Lythraceæ.

COM. NS. :—*G.* Kakria; *H.* Adhauri, Balli, Katdhaura, Lendya, Seina; *K.* Chununge, Ventaku; *M.* Bondara, Lendi, Nandi, Sokutia; *Tr.* Lendi.

CHAR. :—A large deciduous tree, 15-21 m. high; girth 1·8-2·4 m. *Bark* light brown, thin, exfoliating in long, thin, woody scales. Glabrous, branchlets and young leaves are pubescent at least on petiolate, rounded at the base, acute or acuminate-obtuse, glaucous beneath. *Fl.*—white, fragrant on slender pedicles, forming lax axillary or terminal panicles. *Calyx* glabrous or minutely-downy, not ribbed; lobes 6-7, ultimately erect, adpressed to the fruit. Petals clawed crumpled. The 6 outer stamens much longer than the inner ones. *Fr.*—capsule, oblong or obovate-oblong, 1·3-2·5 cm. long 3-4-celled. Seeds with a terminal wing. *Fl. t.*—Apr.-June. *Fr. t.*—rainy season. Sheds leaves—Mar.-Apr.; new leaves—May. The tree often produces burrs especially when injured. Large trees are often hollow in the centre.

DISTR. :—Throughout the State in deciduous forests from the coast inland; Konkan, Deccan hills; S. M. Country, (Belgaum), base of the W. Himalayas, W. Peninsula.

DYES and TANS. :—The bark, along with that of *Terminalia tomentosa,* is employed for dyeing skins black (McCann). The bark and leaves are used in Bombay for tanning (Lisboa).

*See*—Fibres, Gums & Resins, Fodder Plants.

## LANNEA GRANDIS Engl.

FAM. :—Anacardiaceæ.

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COM. NS. :—*H.* Ginyan, Kimul, Mogena ; *K.* Gojal, Punil, Shimti ; *M.* Moi, Moja, Shimbat, Shimti.

CHAR. :—A moderate-sized or large deciduous tree, 12-15 m. high, girth 1·5-2·4 m. *Bark* 1·3 cm. thick, grey, compact, smooth, exfoliating in small irregular plates, inner bark red, mucilaginous. Young parts and inflorescence covered with stellate tomentum. *L.*—31-47 cm., unequally pinnate near the ends of branches. Leaflets membranous, glabrous, sub-sessile, the terminal one long petiolate. Racemes slender ; male compound, long ; female simple and short. *Fl.*—tetramerous, purplish or greenish-yellow, on short pedicels. Bracts ciliate. Sepals obtuse, ciliate. Petals twice as long, oblong, coriaceous, spreading. Stamens 8, in male flowers as long as the petals. Ovary, sessile, 1-celled. *Fr.*—drupe, kidney-shaped, red or purple when ripe, size of a pea. *Fl. t.*—Feb.-Mar. *Fr. t.*—hot season. Remains leafless from Feb.-June. On the east side of the Peninsula in leaf almost throughout the whole year ; ugly when leafless but handsome in full foliage.

DISTR. :—Common throughout the State in deciduous forests. Throughout the hotter parts of India. Lower Himalayas and the sub-Himalayan forests, Assam, Bengal, Madras, Madhya Bharat, South India ; Burma, Ceylon and Andamans. Very commonly planted.

DYES and TANS. :—The bark furnishes a small amount of brownish-red colouring matter, which produces on Tassar silk a golden or pale brown tint.

The bark is used in tanning.

*See* Gums and Resins, Fodder Plants.

## LAWSONIA ALBA Lam.

FAM. :—Lythraceæ.

COM. NS. :—*E.* Henna plant, Tree mignonette ; *G.* Medi, Mehndi ; *K.* Gorantha, Madranga ; *M.* Mendi ; *Sk.* Medika, Nakharanjaka, Ragangi, Yavaneshta.

CHAR. :—A glabrous much branched shrub, lateral branches 4-gonous, often ending in spinous point ; *L.*—opposite, elliptic or broadly lanceolate, mucronate ; *Fl.*—in terminal pyramidal and panicled cymes, many, fragrant, white or rose coloured ; *Fr.*—capsule, globose, veined outside supported by persistent calyx ; *Sd.*—angular, truncate ; *Fl, t.*—Apl.-July.

DISTR. :—Coromandel coast and Madhya Bharat; common on the sand-dunes near Tuticorin; in the drier parts of the Indian Peninsula, Ceylon; wild in Arabia, Iran and Baluchistan.

DYES and TANS. :—The decoction of the leaves is occasionally used in dyeing cloth, the colour produced being a shade of yellow or reddish-brown known as *Malagiri.* It is also employed in combination with other dyes in Rajasthan for dyeing handkerchieves of an almond colour. The most important use of the dye in India is as toilet article, the leaves being used for staining the fingers, nails, hands and feet, and for dyeing hair. It is much used by the Muslims for dyeing beards.

*See*—Oils.

## LORANTHUS LONGIFLORUS Desr.

FAM. :—Loranthaceæ.

COM. NS. :—*E.* Lorenthus; *G.* Vando; *H.* Bonda; *K.* Badanike; *M.* Bandgul.

CHAR. :—A large bushi parasite, branches hanging. *L.*—thick, succulent, light-green. *Fl.*—P. long, tubular, greenish-white, borne in clusters. *Fr.*—small, juicy berry, pink; seed imbedded in a sticky substance.

DISTR. :—Common on the mango trees in Bombay and throughout the Konkan. Kanara—parasite on many kinds of trees. More or less throughout India; Ceylon.

DYES and TANS. :—The wood is largely used as a finishing tanstuff in order to render leather soft.

सत्यमेव जयते

## MADHUKA INDICA Gmel.

### (Bassia latifolia).

FAM. :—Sapotaceæ.

COM. NS. :—*E.* Honey Tree, Mahuva of S. India; *G.* Mahuda, Mavonujhad; *H.* Moha, Mohua; *K.* Ippe, Huli, Movaro; *M.* Mohachejhad, Mohwa.

CHAR. :—A large evergreen tree, 12-15 m. high; girth 1·2-1·8 m. *Bark* dark yellowish-grey, thick, slightly furrowed, scaly; inner bark red, milky. Young shoots villous. *L.*—10-18 × 2·5-4 cm., clustered near the ends of the branches, lanceolate, narrow at both ends, entire, smooth on villous petioles 2·5-4 cm., stipules villous, caducous, ensiform. *Fl.*—crowded near the ends of branches, pedicels 5-7·5 cm., sub-erect, one-flowered. Calyx segments 4, acute. Corolla tube equal to length of calyx, limb 8-10-cleft. Anthers 16-20 in two series. *Fr.*—berry, oblong, size of a plum yellowish when ripe. *Fl. t.*—Apr.-May. *Fr. t.*—Aug.-Sept.

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DISTR. :—Common in the dry forests and along the rivers and nalas in the State; common in the Konkan and N. Kanara but nowhere abundant. Western Peninsula, Mysore, Karnatak; Ceylon, upper Burma. Often planted.

DYES and TANS. :—Bark is often used as an adjunct in dyeing where dark colours or black are desired. Along with the leaves it is also sometimes employed as a tan.

*See*—Medicinal Plants, Oils, Famine Plants, Gums & Resins, Fodder Plants.

### MALLOTUS PHILIPPINENSIS Muell.

FAM. :—Euphorbiaceæ.

COM. NS. :—*E.* Monkey-face Tree; *G.* Kapilo; *H.* Kamala, Kambhal, Raini; *K.* Mulichillu, Kapila, Kesarimavu; *M.* Shendri, Kapila.

CHAR. :—A small evergreen tree, 7·5-9 m. high; girth ·9-1·2 m. *Bark* ·6 cm. thick, grey, inner substance red, marked by irregular cracks. Branchlets, inflorescence, and under surface of leaves hoary. *L.*—7·5-15 × 3·1-7·5 cm., alternate, ovate or ovate-lanceolate, acuminate or obtuse, glabrous, with minute red glands beneath and 2 depressed glands at the base above, entire, or sometimes slightly toothed; petioles 5-7·5 cm. *Fl.*—white and yellow, small, sessile or sub-sessile in axillary and terminal paniculate spikes; calyx furnished with red glands; stamens about 26. Ovary tomentose, 3-celled; styles 3, thickly plumose. *Fr.*—capsule, ·9-1·3 diam., 3-lobed, 3-celled, 3-valved, covered with a red powder consisting of *Kesin* mixed with minute stellate hairs (Brandis). *Fl. t.*—Nov.-Jan. *Fr. t.*—Feb.-May.

DISTR. :—Throughout the State in dry and open thorn forests; more common in the Konkan jungles and hills; also in the Deccan and Gujarat. Throughout Tropical India; Sind, Ceylon, Malay Islands, China and Australia.

DYES and TANS. :—The fruits yield the *Kamala* dye of commerce. It is obtained from the red glands on the surface of the fruits. The fruits are collected when ripe, placed in a cloth or sack and then beaten or shaken until the red powder is all removed from the glands. It is also obtained by rubbing the fruits between hands or by stirring them in water and then drying the powdery sediment. The dye is extensively used for dyeing silk a deep bright orange or flame colour. When mixed with other ingredients the colour can be toned from pale yellow to dark-red.

Bark is used as a tan. It is a poor tanning material and imparts a deep reddish colour.

*See*—Medicinal Plants, Oils, Fodder Plants.

## MANGIFERA INDICA Linn.

FAM. :—Anacardiaceæ.

COM. NS. :—*E.* Cuckoo's Joy, Mango tree; *G.* Ambo, Amri; *H.* Am.; *K.* Mavin-mara, Mavu, Rasala; *M.* Amba; *Tr.* Mango.

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CHAR. :—A large evergreen tree 15-20 m. high, with girth upto 4-5 m. *Bark* thick, dark-grey, nearly black, rough with numerous small fissures and exfoliating scales. *L.*—coriaceous, oblong-lanceolate 12·5-25 × 5-7·5 cm., shining above. *Fl.*—monoecious in terminal panicles, pubescent. Calyx 4-5-partite, deciduous. Petals, 4-5, oblong with 3 orange-coloured ridges on the inner face. Stamens 4-5, only one fertile. *Fr.*—drupe, large, fleshy, sub-ovoid, 7·5-20, cm. long, stone compressed hard. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-June.

DISTR. :—Common everywhere, wild and cultivated in rain forests of Konkan and N. Kanara ghats and the Satpudas; cultivated throughout the State; tropical Himalayas, Bhutan, Bihar, Khasia Hills, Sikkim, Western Peninsula from Khandesh southwards; cultivated throughout India for its fruit: Burma.

DYES and TANS. :—The bark and leaves yield a yellow dye which is not much used. Samples of the bark were sent by the Government among other dye-stuffs for examination. It yielded a very beautiful, though generally light and more or less yellow, shades of brown, slate and drab, when used with cotton, silk or wool. In Monghyr, bark is employed with *Maduca Indica, Punica granatum* and *Bauhinia variegata* for dyeing yellow. It is used in combination with the barks of several other trees in obtaining a permanent black. The dry unripe fruit is largely used as a mordant specially in dyeing with safflower.

The bark is employed for tanning in the Dacca district and Bankura. The leaves are similarly employed in Oudh.

*See*—Medicinal plants, Fruit trees, Gums and Resins, Sacred Plants, Fodder Plants.

## MELASTOMA MALABATHRICUM Linn.

FAM. :—Melastomaceæ.

COM. NS. :—*E.* The Indian Rhododendron; *M.* Lakheri, Sarkoli.

CHAR. :—A very handsome low shrub. *L.*—broad lanceolate, very bright-green, rough, strongly ribbed. *Fl.*—Very large, rose-coloured, 3-5 together. *Fr.*—Small, broadly ovoid, Seeds numerous, minute.

DISTR. :—Konkan, S. M. Country, N. Kanara—often along the nalas, near evergreen forests; Throughout India except the desert; Ceylon.

Dyes & Tans. :—Fruit yields a purple dye used for cotton cloth (Lisboa).

*See*—Fruit Trees(w).

## MEMECYLON EDULE Roxb.

FAM. :—Melastomaceæ

COM. NS. :—*E.* Iron-wood Tree; *K.* Limb-toli; *M.* Anjan, Lokhandi.

CHAR. :—A small handsome tree. *L.*—ovate, entire, polished. *Fl.*—very small in dense heads; calyx red, petals blue. *Fr.*—round red or purple.

DISTR. :—Very common at Mahableshwar and ghats. South Konkan; South India, Ceylon.

DYES and TANS. :—The leaves are employed in S. India for dyeing a delicate yellow. In conjunction with myrabolans and sappan-wood the produce deep red tinge, much used for dyeing grass-mats and also good for cloth.

*See*—Fruit Trees (w).

## MICHELIA CHAMPACA Linn.

FAM. :—Magnoliaceæ.

COM. NS. :—*E.* Golden Champo; *G.* Champo, Rac Champo; *H.* Champa; *K.* Champige, Sampige; *M.* Sonechapha; *Tr.* Champ.

CHAR. :—A large evergreen tree, 9-18 m. high (in favourable places upto 30 m.). *Bark* grey, smooth, 1·3 cm. thick. *L.*—ovate, pointed, wavy, 20-26 cm. long, nearly glabrous when full grown. *Fl.*—strongly scented, yellow or orange, shortly pedunculate about 5·2 cm. across. Perianth leaves 15-20. *Fr.*—spike, compact 7·8-15·6 cm. long. Carpets ovoid, blunt, lenticulate. Seeds brown. *Fl. t.*—all the year around but chiefly in May.

DISTR. :—Cultivated all over the State; wild in the Western Ghats. Cultivated in the moisture parts of India and Burma. Wild in Nepal, Sikkim, Eastern Himalayas, Assam, Burma and the Southern parts of the Peninsula.

DYES and TANS. :—The flowers when boiled yield a yellow dye, which is sometimes used as a base for other colours. They communicate an agreeable perfume to the fabrics.

*See*—Medicinal Plants, Oils.

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## MIMUSOPS ELENGI Linn.

FAM. :—Sapotaceæ.

COM. NS. :—*G.* Baphuli, Borsalli, Vareuli; *H.* Bakul, Bolsari, Mulsari; *K.* Bakul, Kalhale, Mugule, Manjale; *M.* Bakul, Vavali.

CHAR. :—A large glabrous evergreen tree, 12-15 m. high; girth 1·2-2·1 m., head compact, leafy; trunk erect. *Bark* grey, rough, deeply cracked with vertical and transverse fissures; young shoots and pedicels shortly rusty-pubescent. *L.*—7·5-10 × 2·5-4 cm. entire, smooth, coriaceous, shinning, glabrous, elliptic-oblong, accuminate, on a petiole 1·3-2 cm. *Fl.*—white, very fragrant, about 1·5 cm. diam., in axillary fascicles of 2-8, on drooping tawny pedicels 4-6 lin. Calyx segments 8. Corolla lobes three times as many as sepals; the outer series consists of 16 (occasionally 12), the inner of 8 (occasionally 6) lobes. Stamens 8. *Fr.*—berry, about 1·3-2·5 cm., yellow when ripe, smooth edible, 1-seeded by abortion. *Fl. t.*—Jan.-Apr. *Fr. t.*—about the end of rains.

DISTR. :—Evergreen forests; common in the rain-forests of N. Kanara and the Konkan; often planted in gardens; Western Peninsula; Ceylon, Malaya; cultivated in the tropics.

DYES and TANS. :—The bark is used in certain districts of Bengal, either by itself or in combination with that of Terminalia tomentosa (Ain) for dyeing shades of brown. The bark contains only a small amount of brownish-red colouring matter; with cotton it gives a light grey and with silk various shades of reddish-drab, drab and fawn.

Bark is also employed as a tan in various parts of the country. As a tanning material this is of very little commercial value.

*See*—Medicinal plants, Fruit Trees, Oils, Gums & Resins. Sacred Plants.

## MORINDA CITRIFOLIA Linn.

FAM. :—Rubiaceæ.

COM. NS. :—*E.* Indian mullberry; *G.* Al, Saraoji; *H.* Al, Ach; *K.* Ainshi, Mulgule, Tagase; *M.* Bartondi.

CHAR. :—A small glabrous tree, trunk straight, 3·6-4·5 m. high; girth ·3-·6 m.; branchlets obtusely 4-angled. *Bark* smooth, yellowish-white. *L.*—usually 15-25 cm., short petioled, shinning, oval-oblong or broadly elliptic, acuminate, acute or obtuse, one of the pair next the peduncle often absent. Stipules large, broader than long or semilunar, entire or 2-3 fid. *Fl.*—white, small, fragrant, in globose heads; peduncles 2·5 cm. long or more, solitary, leaf-opposed, bracteate. Bracts few, foliaceous. *Fr.*—smooth, glossy, white when ripe, about the size of a small egg. *Fl. t.*—May-June. *Fr. t.*—rainy season.

DISTR. :—Cultivated in the State, especially in Khandesh and near Pandharpur. *Var. bracteata* common along the coast of the Konkan, quite near the sea and certainly indigenous, cultivated widely in many places throughout India, Burma, China, Formosa.

DYES and TANS. :—Wood, root and root-bark are the chief sources of the dye of commerce, named *Al* or *Ach.* The colour produced is a dull-red and not so brilliant. The red obtained is not permanent and the mordant used is alum. The colours given by *Al*, vary from reddish-yellow, through pink and various shades of red upto a dark brownish-red. The dye contained in the root-bark seems to be the best red, whereas that contained in the woody part of the root is more yellow than red. Before dyeing with *Al,* the material is almost universally passed through a preliminary process of preparation, more or less elaborate. The fabric is first washed in plain water and dried, then steeped in a mixture of castor oil, carbonate of soda and water overnight and dried. This process is repeated for several days, after which it is thoroughly washed and carefully dried. By this process the fabric acquires a soft silk-like lusture. It is then dyed by steeping in dye-stuff for four days and then washed.

*See*—Medicinal Plants, Famine Plants.

### NYCTANTHES ARBOR-TRISTIS Linn.

FAM. :—Oleaceæ.

COM. NS. :—*E.* Coral or night-flowering jasmine, Indian Mourner; *G.* Jayaparvati; *H.* Har, Har-singhar, Sooli; *K.* Harsing, Parijat; *M.* Parijataka, Prajakta.

CHAR. :—A large shrub or a small tree rough all over with stiff hairs. Young branches 4-angled. *Bark* light-brown, rough. *L.*—opposite 5-10 × 2·5-6·3 cm., ovate, oblong-ovate, acuminate, entire. *Fl.*—white with a deep orange tube, fragrant sessile; open in the evening and fall early in the morning, each supported by 2 bracts. *Fr.*—capsule, obovate, truncate or notched, about 4 cm. long, glabrous. *Fl. t.*—more or less throughout the year; abundant July-Sept.

DISTR. :—Found wild in the Satpuda forests of Khandesh, outer Himalayan ranges from the Chenab to Nepal, Assam, Madhya Bharat, Bengal and southwards to the Godavari; widely cultivated in gardens all over the State and in many parts of India; Burma.

DYES and TANS. :—The flowers yield dyes. The corrolla-tubes are orange coloured and give a beautiful but fleeting orange or golden dye, which is mostly used for dyeing silk, which takes a very bright yellow colour. It has got a great affinity for wool. White portion of the flower also yields a purple dye known in India as Gulkama. The inner bark also affords a red dye, when beaten with a little lime.

The bark is said to be employed for tanning.

*See*—Medicinal Plants, Oils, Sacred Plants.

## OCHROCARPUS LONGIFOLIUS Benth & Hook. F.

FAM. :—Guttiferæ.

**SECTION 3.**

**Dyes and Tans.**

COM. NS. :—*K.* Gardundi, Surangi, Punay, Wundi; *M.* Surangi.

CHAR. :—A large evergreen tree, 12-18 cm. high, with a girth of 1·8 m. *Bark* reddish brown, ·67 cm. thick, scaly, often covered with black patches, exuding a red gum. Glabrous; young shoots terete, youngest slightly 4-sided. *L.*—15·6-20·8 × 3·7-8·13 cm., opposite or ternately, verticillate, oval-oblong, linear-oblong, or oblong-lanceolate, obtuse at the apex, slightly attenuated or rounded at the base, hard, thickly coriaceous, dark-green, midrib prominent but the ventilation inconspicuous; petiole stout. *Fl.*—polygamous, white streaked with orange-red, fragrant, 1·7 cm. diam., numerous on slender pedicels, arising from tubercles in the axils of fallen leaves; buds globose. Calyx rupturing into 2 valves, reflexed during flowering. Petals 4, acute, deciduous. Stamens numerous. Ovary 2-celled; style short, thick, sublate; stigma large, peltate. *Fr.*—2·6 cm. long, obliquely-oblong, crowned by the hard style, 1-seeded. *Fl. t.*—Mar.-Apr. *Fr. t.*—cold season. The tree is polygamous in wild state, but often becomes hermaphrodite when cultivated.

DISTR. :—Ghats of Konkan, very common in Ratnagiri, Matheran, Kanara; Malabar. Cultivated in Orissa, Northern Circars and elsewhere.

DYES and TANS. :—The dried flower buds known in commerce as *Tambada nagkesar,* are used for dyeing silk.

## OLDENLANDIA CORYMBOSA Linn.

FAM. :—Rubiaceæ.

COM. NS. :—*G.* Parpat; *H.* Damanpaper; *M.* Papli, Phapti; *Sk.* Parapate.

CHAR. :—An annual herb, varying from 7·5-38 cm. high; stems numerous. *L.*—subsessile, linear or linear lanceolate, margins recurved and scabrous, stipules with bristles. *Fl.*—on filiform pedicels, usually 2-3 cm. long, lobes acute. *Fr.*—capsule, globose or pyriform. *Sd.*—pale brown, angular. *Fl. t.*—Sept.-Nov.

DISTR. :—Throughout India, Ceylon, Tropical E. Asia to Java and the Philippines.

DYES and TANS. :—The root-bark with alum as mordant gives a beautiful red dye which is fast. It was formerly much employed in Madras for dyeing handkerchives. The root is known as a *Chay-root* of commerce.

## OLDENLANDIA UMBELLATA Linn.

FAM. :—Rubiaceæ.

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COM. NS. :—*E.* Indian madder ; *M.* Chirval.

CHAR. :—Annual herb ; much branched from the base, branches angular, rough. *L.*—numerous, sessile, linear, rather close. *Fl.*—3-10 in. axillary cymes.

DISTR. :—Deccan ; Western Peninsula, Orissa, Bengal, Burma, Ceylon.

DYES and TANS. :—As the preceding.

## ORYXYLUM INDICUM Benth.

FAM. :—Bignoniaceæ.

COM. NS. :—*E.* Indian Trumpet Flower ; *G.* Podval, Tetu ; *H.* Arlu, Pharri, Ullu ; *K.* Alangi, Bagi, Mokka, Tetu ; *M.* Tetu.

CHAR. :—A small deciduous tree, 7·5-12 m. high ; girth ·6-1·5 m. *Bark* light brownish-grey, soft, yields a green juice when cut. *L.*—1·2-1·5 m. long ; pinnae 3-4-pairs, the lowest pair bipinnate ; leaflets 7·5-20 cm. long, broad-ovate, acuminate, petioled, subcordate, entire. *Fl.*—large, fetid, dark-red, fleshy, on short pedicels in erect terminal racemes. Calyx about 2·5 cm. long. Corolla 5-7·5 cm. diam. *Fr.*—capsule, ·6-1·2 m. × 7·5-10 cm., flat. Seeds 4 cm. wide, with a large pellucid wing all round. The pod resembles a scabbard. *Fl. t.*—rainy season. *Fr. t.*—cold season. Leafless Feb.-Mar. ; new foliage Apr.-May.

DISTR. :—Throughout the Konkan and the N. Kanara ghats in moist forests, very common in the rain-forests near Nilkund. Throughout India except in the western drier areas ; Ceylon, Malaya, Indo-China (Viet Nam), Burma.

DYES and TANS. :—The bark and the fruits are used as mordant in dyeing and tanning.

*See*—Medicinal Plants.

## PTEROCARPUS MARSUPIUM Roxb.

FAM. :—Papilionaceæ.

COM. NS. :—*E.* Indian Kino tree, Malabar Kino tree ; *G.* Bia, Bibla ; *H.* Bija, Bigash, Hirdokhi ; *K.* Benga, Bibla, Honne ; *M.* Bibla ; *Tr.* Bijasal.

CHAR. :—A large deciduous tree, 15-18 m. high ; girth 1·8-2·4 m. *Bark* grey, with long vertical cracks, exfoliating in small pieces of irregular shape and size. Leaflets alternate, coriaceous, 5-7, obtuse,

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acute or emarginate. *Fl.*—numerous, yellowish white, 1·3 cm. in diam., arranged in paniculate racemes. Petals twice the length of the calyx, waved or curled. Sheath of monodelphous stamens is sometimes deeply divided into 2. *Fr.*—pod, 2·5-5 cm. broad, articular. *Fl. t.*—May-June. *Fr. t.*—Dec.-Mar.

DISTR. :—Throughout the State in deciduous monsoon forests, scattered but not gregarious; ascends to 1,100 m. in Akrani Khandesh and Dangs. Common in N. Kanara, Konkan, Western Peninsula, Madhya Bharat and S. India; Ceylon.

DYES and TANS. :—The gum from the tree is used in dyeing and tanning.

The bark—occassionally employed for dyeing—was found to contain brownish-red colouring substance, which produced reddish-fawn colour with Tassar silk.

*See*—Medicinal Plants, Gums & Resins, Fodder Plants, Oils.

## RHIZOPHORA MUCRONATA Lam.

FAM.—Rhizophoraceæ.

*COM. NS.* :—*M.* Kandal.

CHAR. :—A small evergreen glabrous tree, 4·5-7·5 m. high; girth ·3-·6 m. *Bark* brown, fairly smooth, with vertical clefts. *L.*—7·5-18 × 4-10 cm., oval, or elliptic-oblong, mucronate, narrowed at the base, rather long-petioled, coriaceous. *Fl.*—pedicellate, greenish-white, rather large, sweet-scented, on peduncles arising from the axils of leaves, longer than the petioles, about 3-6 flowered. Calyx segments triangular. Petals villous at their involute margins. Stamens 8. *Fr.*—about 2·5 cm. diam., ovoid or obconic, furrowed, supported at the base by the reflexed limb of the calyx. Radicle of the seed, germinating within the fruit on the tree, about ·75 m. long. *Fl. t.*—Aug.-Dec.

DISTR. :—Common in the salt marshes and muddy tidal flats along the coast of the States of Bombay, Madras, Bengal Sind, Burma, Malacca, Andamans; also found in Africa and Australia.

DYES and TANS. :—The bark is said to be used to give a chocolate dye. It is used in local tanneries. The tan is recommended to be used as a preliminary preparation for cheap leather. The extract of the bark is known as *cutch* in commerce. The bark has been exported to Europe but the leather prepared with it solely, is always inferior in colour and quality. The bark has very little demand outside due to the low percentage of tannin.

*See*—Fodder Plants.

## RHUS MYSURENSIS, Hook, F.

FAM. :—Anacardiaceæ.

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COM. NS. :—*M*. Amoni.

CHAR. :—A spiny large shrub ; branches woody. *L*.—3 foliate leaflets obovate, sub-lobed, terminal leaflet larger. *Fl*—in terminal and axillary panicles, small. *Fr*.—Small, sub-globose, brown, shinning.

DISTR. :—Deccan—hills near Poona, S. M. Country—Common in the Dharwar forests ; N. W. India. Punjab, W. Peninsula ; Sind.

DYES and TANS. :—The bark which contains 15% of tannin, is largely used by native tanners. It gives a splendid buff or brown colour to the leather.

## RUBLIA CORDIFOLIA, Linn.

FAM. :—Rubiaceæ.

COM. NS. :—*E*. Indian Madder ; *H*. Majit, Manjit ; *K*. Manjishtha ; *M*. Manjishtha ; *Sk*. Aruna, Chitralata, Manjishtha, Rohini, Tamravalli.

CHAR. :—Perennial, climbing herb ; roots very long, cylindric, with a thin red bark ; stem very long, grooved, branches quadrangular. *L*.—in whorls of 4, one pair with longer petioles ovate, lower leaves larger, all scabrous with white prickles, five-nerved, petioles triangular, prickly. *Fl*.—in terminal panicled cymes, greenish. *Fr*.—didymous or globose, smooth, shinning, purplish, black when ripe. *Fl. t*.—Oct.-Jan.

DISTR. :—Throughout India in hilly districts, Ceylon, Malaya, Peninsula, Java, Japan, tropical Africa.

DYES and TANS. :—The *Manjit root* or the East Indian madder is much employed by the natives of India in dyeing coarse cotton fabrics, or the thread. It gives various shades of scarlet, coffee—brown, or mauve. The fabric is steeped in the infusion of wood or roots of the plant and afterwards being mordanted with a solution of alum. Manjit dyeing was practised more or less all over the State, but one of the principal seats of the industry was Div in Gujarat.

## SCHLEICHERA TRIJUGA Willd.

FAM. :—Sapindaceæ.

COM. NS. :—*E*. Ceylon-oak, Gum-lac tree or Honey tree ; *G*. Kossama ; *H*. Gausam, Kosum, Kulimaya, Kukuli, Sagada, Shargodi ; *M*. Kohan, Kusumb, Peduman ; *Tr*. Kusum.

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CHAR. :—A large beautiful deciduous tree with deeply furrowed trunk, sometimes 18-21 m. high, girth 2·4-3·6 m. *Bark* grey, exfoliating in small rounded plates of irregular shape, and size. Young parts puberulous. *L.*—abruptly pinnate, 21-42 cm. at the ends of branches. Leaflets 4-8, 2·5-26 × 1·7-11 cm., opposite or sub-opposite, oblong, elliptic-oblong or nearly lanceolate, the lowest pairs the smallest, obtuse or shortly acuminate, entire, coriaceous, sessile. *Fl.*—small, yellowish-white or greenish on short pedicels, arranged in axillary, branched racemes. *Fr.*—2-2·5 cm. long, smooth, ovoid, unarmed or sometimes echinate. *Fl. t.*—Feb.-Mar. Sheds leaves in cold season; new leaves in Feb.-Mar.

DISTR. :—Common throughout India and the State in both dry and moist forests from the N. W. Himalaya to Madhya Bharat and South India; Ceylon, Burma.

DYES and TANS. :—A dye is said to be obtained from the flowers.

*See*—Oils, Medicinal plants, Fodder Plants.

## SEMECARPUS ANACARDIUM Linn.

FAM. :—Anacardiaceæ.

COM. NS. :—*E.* Marking Nut tree; *G.* Bhiuamu; *H.* Bhela, Bhilava, Bilaran; *K.* Gerkayi, Keru; *M.* Biba, Bibwa.

CHAR. :—A moderate-sized deciduous tree; trunk erect 9-12 m. high, girth about 1·2 m- *Bark* 1·3 cm., thick, dark brown, rough, exfoliating in very irregular inner patches; inner bark fibrous; dioecious; young branches, inflorescence, petioles and the under side of leaves covered with a short, pale pubescence. *L.*—23-47 × 13-31 cm., approximated near the ends of branches, oblong or obovate-oblong, rarely linear-oblong, usually contracted below the middle, rounded at the top, rounded cordate or cuneate at the base, thick coriaceous, on rounded, thick petiole; nerves 16-25 pairs, conspicuous. *Fl.*—greenish-white or yellow, small, sub-sessile, fascicled, arranged in erect, large terminal panicles as long as the leaves or shorter. Petals 3-4 times the length of the calyx, spreading, glabrous. Stamens 5, filaments slender; ovary densely tomentose. Styles 3. *Fr.*—drupe, obliquely oval or oblong, smooth, shining, purplish black; cup-shaped hypocarp, orange-red, fleshy and edible. *Fl. t.*—varies but generally in the hot season. *Fr. t.*—Nov.-Feb. Sheds leaves in Feb.; new leaves in May.

DISTR. :—In deciduous dry forests throughout the State. Abundant in dry forests of Konkan, Deccan and Gujarat; sub-Himalayan tract from the Beas eastwards; Assam, Khasia hills, Chittagong, Madhya Bharat and W. Peninsula; E. Archipelago, Australia.

DYES and TANS. :—The pericarp of the fruit contains a bitter and powerful astringent principle which is universally used in India as a substitute for marking ink. It gives black colour to cotton fabrics, which is insoluble in water, but soluble in alcohol. The substance is used as an ingredient in some of the marking-ink preparations. In some parts of Bengal fruits are regularly used as a dye for cotton cloth. The bark is also used as a dye (Brandis).

The nuts of the tree are used by tanners especially in dressing the hides, of rhinoceros and buffalo, to form targets. Pounded and boiled in rape oil the fruit makes an excellent remedy for staying putrification when begun in hides.

*See*—Medicinal Plants, Gums & Resins, Oils, Poisonous Plants & Fish Poisons.

### SOYMIDA FEBRIFUGA A. Juss.

FAM. :—Meliaceæ.

COM. NS. :—*E*. Bastard cedar, Indian Redwood; *H*. Rohan; *K*. Some or Swami-mara, Sumbri; *M*. Lal-chandan, Palara, Rohan.

CHAR. :—A large deciduous tree, 21-24 m. high, girth 2·1-2·4 m. *Bark* bluish-grey or dark-brown, rough, exfoliating in large plates or scales. L.—abruptly pinnate, 23-47 cm. long. Leaflets 6-12, 4-13 × 2-7 cm., opposite, elliptic or oblong, obtuse at the apex, oblique at the base, on very short petiolules. *Fl.*—greenish-white on short pedicels forming large panicles often equalling the leaves. Calyx deeply 5-cleft. Petals 5, obovate, contorted in bud. Bracts ovate-deltoid, small. *Fr.*—capsule, oblong, obovoid, smooth, black when ripe, size of an apple. *Fl. t.*—Apr.-May. *Fr. t.*—July-Aug. New leaves appear in hot season white part of old leaves are still on the tree.

DISTR. :—Usually on dry stony hills in Gujarat, Khandesh, Belgaum and Dharwar, Madras State, Madhya Bharat; Ceylon.

DYES and TANS. :—The bark is used in tanning. It gives a brown colour.

*See*—Medicinal Plants, Fibres.

### SYZYGIUM CUMINI Skeel.

### (Eugenia jambolana—Lam.).

FAM. :—Myrtaceæ.

COM. NS. :—*E*. Black or Java plum, Jambul; *G*. Jambu, Jambudi, Jambura; *H*. Jam, Jamen, Pharenda;; *K*. Jambu or Nayinerale, Neralu; *M*. Jambul; *Tr*. Jaman.

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**Dyes and Tans.**

CHAR. :—A large evergreen tree, 24-30 m. high; girth 1·5-3·6 m. *Bark* up to 2·5 cm. in thickness, light to dark-grey or brown, fairly smooth with shallow depressions caused by exfoliation, red inside, glabrous. *L.*—7·5-5·15 cm., coriaceous, smooth, shining, entire, ovate or oblong-lanceolate, more or less acuminate, penninerved, the numerous vein uniting within the margin. *Fl.*—numerous, greenish-white, odorous, in short and compact panicled cymes, usually lateral on the previous year's branches, occasionally axillary, or terminal, calyx tube funnel-shaped, truncate or obscurely lobed. Petals cohering nad falling off in a calyptra. *Fr.*—berry, oblong or sub-globose. ·6-2·5 cm., crowned with the base of the calyx, purple, succulent when ripe. *Fl. t.*—Mar.-May. *Fr. t.*—Apr.-July. Renews leaves in hot season while old ones are falling off. The cultivated size of fruit and height. *Var. caryophyllifolia* with ovate-lanceolate, long acuminate leaves and globose fruit, size of a pea; common at Mahabaleshwar *Var. obtusifolia* with obtuse leaves and large oblong fruit; in Konkan.

DISTR. :—Throughout the State, both wild and cultivated along river banks and moist localities. Common at Mahabaleshwar, Khandesh Akrani and highest hills of Nasik and Satara districts. Common in the moist forests of N. Kanara and the Konkan. Throughout India. Ceylon, Malaya, Australia; very often planted.

DYES and TANS. :—The bark is used for dying and tanning. In Assam it is employed along with red *manjit dye* to impart brilliancy to the colour. It is also used to colour fishing nets. It is mentioned as one of the ingredients in the preparation of a permanent black.

*See*—Medicinal Plants, Fruits Trees, Sacred Plants, Fodder Plants.

## TAMARINDUS INDICA Linn.

FAM. :—Cæsalpinaneæ.

COM. NS. :—*E.* Tamarind tree; *G.* Amli; *H.* Amli, Imli, Nuli, Teter; *K.* Amla, Amlike, Hunase; *M.* Chinch.

CHAR. :—A large evergreen tree, 12-18 m. high. *Bark* 1·3 m. thick, dark-grey, with longitudinal fissures and horizontal cracks. *L.*—abruptly pinnate, 5-12·5 cm. long., rachis channelled; leaflets subsessile, 10-20 pairs, closely set. *Fl.*—in lax few-flowered racemes at the end of branchlets; corolla petals 3 (one upper and 2 lateral), subequal, yellowish with pink stripes stamens 3 fertile. *Fr.*—pod, 7·5-20 × 2·5 cm., 1 cm. thick, slightly curved, scurfy, seeds 3-12, obovate-oblong, truncate ends with a shallow oblong pit on each of the flat faces, brown, shining. *Fl. t.*—Apr.-June. *Fr. t.*—ripe Feb.-Mar.

DISTR. :—Evergreen forests of Konkan and N. Kanara; shady parts of rain forests. Self-sown near villages and in waste lands, also cultivated throughout the State. Throughout India and Tropics, generally, indigenous in tropical Central Africa.

DYES and TANS. :—An infusion of the leaves is said to yield a red dye and to impart yellow shade to cloth previously dyed with indigo. The leaves, flowers and fruits contain a large proportion of acid and are much employed as auxillaries in dyeing, especially along with safflower.

*See*—Medicinal Plants, Oils.

### TAMARIX DIOICA Roxb.

FAM. :—Tamaricaceæ

COM. NS. :—*H.* Laljhav.

CHAR. :—A very graceful gregarius shrub or small tree; trunk short, 1·8-2·1 m. high, rarely 4·5 m., branches with drooping extremities. *Bark* grey, with reticulate cracks, showing the red inner bark. *L.*—small, scale-like, tabular, sheathing, obliquely-truncate and pointed, glabrous and green. *Fl.*—diœcious, numerous, sessile, rose-coloured, in terminal panicled spikes. Bracts acuminate. *Male fl.*—stamens 5, inserted in the notches of disc, anthers sagittate, purple. *Female fl.*—stamens abortive. *Fr.*—capsule, oblong, tapering. *Fl. t.*—May-July. *Fr. t.*—cold season.

DISTR. :—Common in the beds of the Konkan and Deccan rivers; Cutch; Bengal, Punjab, and almost all over India near river beds and the sea-coast; Sind, Burma. Cultivated in the gardens.

DYES and TANS. :—The galls which are astringent are employed as as a mordant in dyeing to produce various shades of grey and black with iron salts. They are also employed in tanning.

*See*—Gums and Resins.

### TECTONA GRANDIS Linn.

FAM. :—Verbenaceæ.

COM. NS. :—*E.* Indian Oak, Ship-Tree, Teak; *G.* Sag, Sagach; *H.* Sagun, Sagwan; *K.* Tega, Tegu; *M.* Sag, Sagwan; *Tr.* Teak.

CHAR. :—A large deciduous tree, 21-30 m. high, girth 3·6-4·5 m. (occasionally exceeding 6 m.). *Bark* light-brown or grey, fibrous, with shallow longitudinal cracks, outer bark peeling off in long thin flakes. Branchlets quadrangular, channelled, stellately tomentose, *L.*—opposite 30-60 × 15-30 cm. (much larger in seedlings), rough above, grey tomentose beneath. *Fl.*—shortly pedicelled in cymes. Corolla tubular, 5-6 lobes, lobes unequal white. *Fr.*—sub-globose, somewhat 4-lobed, pericarp dense hairy, endocarp bony. *Fl. t.*—June-Sept. *Fr. t.*—Nov.-Jan. Sheds leaves early in cold season, new foliage in May.

DISTR. :—Throughout the State in monsoon and mixed deciduous forests; abundant all along the slopes of Western ghats to the Mahi river in Gujarat. Best teak-forests in Bombay State are on the slopes of Kalinadi and the Gangavali rivers of N. Kanara. Western ghats of Madras State, Circars, Madhya Bharat; Malaya Peninsula, Burma, Sumatra, Java.

DYES and TANS. :—The leaves are said to yield a yellow or red dye. The leaves have been used and strongly recommended for dyeing silk yellow, olive etc. (Kurz.).

*See*—Medicinal Plants, Oils, Fodder Plants, Gums & Resins.

## TEPHROSIA TINCTORIA Pers.

FAM. :—Papilionaceæ.

CHAR. :—An undershrub; stems and branches angled, densely velvety with yellowish hairs. *L.*—Compound; leaflets 7-13. densely silvery—silky beneath. *Fl.*—Pink, in densely silky 3-12 flowered racemes. Pods linear, flat, more or less hairy.

DISTR. :—Deccan, Konkan, N. Kanara; Western Peninsula.

DYES and TANS. :—A blue dye similar to indigo is sometimes extracted from the plant in Mysore.

सत्यमेव जयते

## TERMINALIA ARJUNA W. & A.

FAM. :—Combretaceæ.

COM. NS. :—*E.* White Murdah; *G.* Arjun-Sadada, Dadado; *H.* Arjan, Arjuna, Kahu, Koha; *K.* Hole-matti; *M.* Arjun, Arjuna-sadada; *Tr.* Arjun.

CHAR. :—A large deciduous tree with thick buttressed trunk and horizontally spreading branches about 24 m. high girth 3·6 m. *Bark* smooth, pinkish-grey, the old layers peeling off in thin flakes. *L.*—13-20 cm., sub-opposite, coriaceous, glabrous when old, oblong or elliptic, often suddently narrowed or cordate at the base, obtuse or acute at the apex; petiole with 2 glands near its apex, or at the base of the leaf. *Fl.*—dull-yellow disposed in pedunculate, terminal and axillary spikes, usually panicled. *Fr.*—2·5-5 cm., coriaceous;

thick wings, truncate or narrowed at the summit, marked with ascending cross lines. *Fl. t.*—Apr.-May. *Fr. t.*—end of rainy and cold season.

DISTR. :—Along banks of rivers and streams, very common in south Konkan and jungles south of Surat, Matheran, S. M. Country (Belgaum); throughout the greater parts of India in the Sub-Himalayan tracts, Chota-Nagpur, Madhya Bharat, Madhya Pradesh, Madras State; Ceylon.

DYES and TANS. :—The astringent bark, in various localities, is said to be sometimes used in dyeing. In Southern India the inner bark is broken into chips and the dye extracted by boiling in water. The tint produced is a dirty-brown or khaki. In Bengal it is employed to dye cotton a light-brown. The ashes of the wood are used in Madhya Pradesh as a fixing agent in dyeing with *Al.*

The bark of the tree which was first introduced into the tannaries at Kanpur in 1915, has since become a well established and important tan-stuff. The dry bark of the stem contains from 20 to 24% of tannin and the dry bark of the lower branches about 18%. It is used for the production of fine upper leather and excellent sole leather. The colour of the leather is light brown with no excessive red tint. In Bengal the bark is generally employed for tanning, mixed with the bark or leaves and fruits of *babul.*

*See*—Medicinal Plants, Gums & Resins, Fodder Plants.

## TERMINALIA CATAPPA Linn.

FAM. :—Combretaceæ.

COM. NS. :—*E.* The Indian Almond; *H.* Bengali-badam; *K.* Taree; *M.* Deshi-badam.

CHAR. :—A large deciduous (in Bombay almost evergreen) handsome tree, 9-12 m. high (in favourable conditions 18-24 m.), girth 1·8-2·4 m. Branches whorled, horizontal, forming table-like tiers. *L.*—15-23 cm., generally softly hairy when young, or glabrous, chartaceous, alternate, crowded at the ends of branches, obovate, oblong, apiculate, base cordate or narrow-rounded with a depressed gland on each side of the midrib. *Fl.*—small, greenish-white, forming solitary axillary spikes, shorter than the leaves; the upper flowers male, the lower hermaphrodite. *Fr.*—oval, or ellipsoid, compressed, with 2-elevated margins, 2·5-4 cm., rather convex on both sides. *Fl. t.*—cold season. *Fr. t.*—rainy season.

DISTR. :—Planted in gardens in Bombay and Poona; also planted in the Konkan and N. Kanara. A native of the Moluccas.

**SECTION 3.**
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**Dyes and Tans.**

DYES and TANS. :—The bark and leaves are astringent. They are mixed with iron salts to form a black pigment with which the people in certain localities make Indian ink. Specimens of the bark examined by Mr. Wardle were found to contain 9% of tannin, and a small amount of colouring matter soluble in water, which by various processes produced light brownish-yellow, light drab, golden fawn, and state colours in silk, light drab, olive and grey in cotton, and pale fawn in wool. The leaves are found to contain a moderate amount of colouring matter which produced various shades of brownish-yellow on silk and wool.

*See*—Oils.

### TERMINALIA CHEBULA Retz.

FAM. :—Combretaceæ.

COM. NS. :—*E.* Black or Chebulic-myrabolan ; *H.* Hirdo ; *H.* Har, Harara, Haria ; *K.* Alate, Harade, Haritaki ; *M.* Hirda.

CHAR. :—A moderate-sized much-branched deciduous tree, 7·5-10·5 m. high, in favourable circumstances 24-30 m. ; girth 1·5-3·6 m. *Bark* dark-brown with numerous generally shallow vertical cracks. Young parts more or less rust-coloured or silvery-hairy. *L.*—not clustered, mostly sub-opposite, ovate, or elliptic-ovate, acute and rounded at the base, 7·5-13 cm., deciduous ; petiole often with 2 glands near the summit. *Fl.*—all hermaphrodite, dull-white or yellowish, subtended with a downy bracteole, arranged in terminal often panicled, spikes, 5-10 cm. long. *Fr.*—ellipsoidal or obovoid from a cuneate base, more or less distinctly 5-angled. *Fl. t.*—May-June. *Fr. t.*—in the next cold season. Sheds leaves in Feb.-Mar. ; new leaves in Apr.

DISTR. :—Moist parts of the Deccan, on trap and common along ghats, common in Khandesh, Akrani, monsoon forests of Belgaum district and N. Kanara. Throughout the greater part of India upto 1,500 m. in the Himalayas, Travancore, Burma, Ceylon.

DYES and TANS. :—The dried fruit (*Hirda*) is occasionally used as a dye by itself, the rind of the fruit is powdered and steeped in water. The cloth steeped in the infusion aquires a dirty grey colour. Both the fruit and the galls produced in quantity on the leaves, are said to give with alum a good permanent yellow. But the most extensive use to which *Hirda* is put as a dye is in the production of various shades of black in combination with some iron salts. It is commonly employed throughout the country as a mordant to concentrate the colour in dyeing with safflower, Al, *manjit* etc. With iron salts it is employed in making country ink. The bark is also occassionally used for dyeing khaki, grey and black. The galls were found to produce yellow on wool.

The fruit is known as a *chebulic myrabolan.* They are one of the most important tanning materials of the pyrogallol class, a class which produces a brownish-coloured deposit on leather, called bloom. Myrabolan tannin is not very astringent and penetrates the hide slowly. When used alone it produces a soft, mallow and rather spongy leather, which does not possess good wearing qualities. It is, therefore, usually blended with other tanning materials. In India they are largely employed with *babul, tarwad* and mangrove barks. The percentage of tannin varies considerably but in dried fruit it is usually between 25 to 40 %. Investigations as to the best time for the collection of fruit show that the highest percentage of tannin is present in ripe fruits. Whole fruits and crushed myrabolans are exported in very large quantities to foreign countries. Solid extract of myrabolans has also been a popular and regular article of commerce. These extracts are in shape of solid blocks containing about 50 to 60% of tannin. It is stated that these solid extracts furnish less satisfactory results than the fruits themselves.

In a country with so many different climatic features and such diversified types of soils as in India it neither follows that the fruit will be in perfection at the same time in various localities nor even produce fruits of equal merit. In the trade a form of the true myrabolan is known as the Jabalpur 1, which are oblong, solid, pointed, and pale green in colour. The difference in quality of the myrabolans at different seasons of the year is of utmost importance. They are of pale buff colour, consisting of a dry pulp varying in thickness and enclosing a stone like kernal which contains no tannin. They should be plump, free from dark bloches and from worm--holes. They should be hard and firm, ringing like fragments of earthernware, when shaken together and if crushed with a hammer, yielding a dry pale powder mixed with hard irregular fragments.

*See*—Medicinal Plants, Oils, Gums & Resins.

## TERMINALIA TOMENTOSA W. & A.

FAM. :—Combretaceæ.

COM. NS. :—G. Hardi, Sadri ; *H.* Asan Sadri, Sain, Saj ; K. Banapu, Kare-Matti, Matli ; M. Ain, Madet ; *Tr.* Laurel.

CHAR. :—A large deciduous tree, 24-30 m. high, girth 2·4-3 m. *Bark* 2·5 cm. thick, grey to black, with long, broad, deep, longitudinal fissures, and short, shallow, transverse cracks ; inner substance red when fresh. Branchlets, young leaves, and inflorescence rusty-tomentose. *L.*—7·5-23 cm.,sub-opposite or alternate, elliptic, ovate or obovate-oblong, glabrous or hairy when old, coriaceous, cordate or suddenly narrowed at the base into short petioles, with 2 glands near the base of the midrib. *Fl.*—of a dull yellow colour

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in panicled spikes. *Fr.*—2·5-5 cm., obovoid-oblong, wings broad, marked with prominent horizontal lines; edges of wings thin, irregularly crenulate. *Fl. t.*—Apr.-May. *Fr.* t.—Jan.-Apr. of next year. Sheds leaves Jan.-Mar.; new leaves at the end of the hot season.

DISTR. :—Common throughout the State in mixed deciduous forests, and in the jungles at the foot of the ghats in Konkan, throughout the moist regions of India; Ceylon.

DYES and TANS. :—The bark is very rarely used as a dye-stuff, being broken up and boiled in water to substract the dye. The resulting colour is brown or buff. It is employed in Bengal along with the bark of *Bakul* to produce a reddish dye used in colouring gunny bags. The bark is used, in the Kolaba district, for dyeing fishing nets.

The chief use of the bark is however as a tan, for which it is lragely employed all over India. It is either used alone to form the tanning liquor or in combination with many other barks such as *Sal, Anjan, Bakul, Peepal, Babul, Amba, etc.* The fruit is also occassionally used as a tanning material.

*See*—Gums and Resins, Fodder Plants.

## TOONA CILATAT Roam.

### (Cedrela toona Roxb.).

FAM. :—Meliaceæ.

COM. NS. :—*E.* Red or Moulmein Cedar, Toon tree; *H.* Lim, Mahanim, Tuni; *K.* Devdari, Gandagheri, Kempu, Tundu; *M.* Huruk, Maha-nim, Tadu; *Tr.* Toon.

CHAR. :—A large deciduous tree, 18-24 m. high (more under favourable circumstances); 1·8-2·4 m. in girth. *Bark* dark grey-brown, exfoliating when old in irregularly woody scales; inner bark red, glabrous. L.—·3-·9 m. long abruptly pinnate, deciduous. Leaflets 8-30, 5-18 × 2-8 cm., generally opposite or sub-opposite, obliquely ovate or lanceolate, acuminate or cuspidate, entire or slightly undulated or serrate, shining, above and sometimes glaucescent beneath, on a rather long petiole. *Fl.*—white, fragrant, on slender short pedicels, arranged in large drooping, terminal panicles, about the length of the leaves or longer. Calyx segments 5, short, round. Petals 5, oblong, ciliate. Stamens 5, occassionally 6, alternating with staminodes, inserted on orange-coloured hairy lobes of the disc. Ovary 5-celled. *Fr.*—capsule, oblong, about 2-2·6 cm. long. Seeds compressed, winged below or at both ends. *Fr. t.*—Jan.-Feb. *Fr. t.*—Mar.-Apr.

DISTR. :—Ravines of Khandala: more or less abundant in the evergreen forests of the konkan and N. Kanara. Forests of the sub-Himalayan tracts and valleys of N.W. Himalayas in the Punjab and

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eastwards chiefly along streams upto Sikkim and Assam, and Eastern Bengal. Throughout Western and Sourthern India at low elevations; Burma. Often planted in avenues and gardens.

DYES and TANS. :–The flowers yield by boiling in water a red and a yellow dye (known as Gulnari in Bengal) said to be used in Mysore for dyeing cotton and woollen fabrics. It is known as *Basanti* (Sulphur yellow) in N. W. Provinces. It was a common practice under native rulers to wear basanti-colour cloth in the spring whence its name *Basant* (spring time). The colour is not fast. The flowers are used in conjunction with the safflower and turmeric to produce the sulphur-yellow colour.

*See*–Medicinal Plants, Gums and Resins, Fodder Plants.

## TRIGONELLA FOENUM-GRAECUM Linn.

FAM. :–Papilionaceæ.

COM. NS. :–E. Fenugreek; *G.* Methi, Methini; *H.* Methi, Muthi; *K.* Menthe-palle; *M.* Methi; *Sk.* Chandrika, Jyoti, Methi, Pitabija Vedhini.

DISTR. :–Punjab, Kashmir, extending through Iran and Abyssinia to the Mediterranean; cultivated in many parts of India.

DYES and TANS. :–The seeds yield a yellow dye and enters into the composition of an imitation of carmine. The yellow decoction produces a fine permanent green with sulphate of copper.

*See*–Vegetables, Condiments & spices.

## VENTILAGO MADARASPATANA Gaertn.

FAM. :–Rhamnaceæ.

COM. NS. :–*E.* Red Creeper; *G.* Ragatarshado; *H.* Pitti; *K.* Haruge, Kubbila, Malamaitra, Poppli; *M.* Khandvel, Lokhandi, Sekalyel; *Sk.* Raktavalli.

CHAR. :–A large much branched woody climber; young branches and panicles pubescent; *L.*–5-10 × 2·5-3·8 cm. oblong-lanceolate or elliptic-ovate, entire or crenate; *Fl.*–in large drooping terminal panicles; buds 5-angled; *C.*–petals 5, greenish, with an offensive odour; *Fr.*–nut about 5 mm. diam., yellowish, globular, prolonged into linear-oblong, 1-nerved wing; *Fl. t.*–Dec.-Jan. (T. Cooks) Rainy season (Talbot's Forest Flora).

DISTR. :–Madras State, Mysore, Ceylon, Tenasserim.

DYES and TANS. :–The root-bark is a much valued dye-stuff in S. India. It yields a beautiful chocolate colour. It is extensively used for dyeing cotton cloth. The colour is utilised by carpet makers

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in Bangalore. The dye is rather fleeting, but can be made fast by alum. It is exceedingly rich in a beautiful red colouring matter and will when proper methods are employed, produce many colours for which cochineal and madder are generally used.

The dye is well adapted for *tassar* silk. (Mr. Wardle).

*See*—Fibres.

## WOODFORDIA FRUTICOSA Kurz.

## (WOODFORDIA FLORIBUNDA, Salisb.).

FAM. :—Lythraceæ.

COM. NS. :—*G.* Dhawadina, Dhavani ; *H.* Dhaw, Dhawai, Santha ; K. Arc, Bela ; *M.* Dhaiti, Phulsatti ; *Sk.* Dhateki, Dhavani, Madhavasini, Tamrapushpi, Vanhishikha.

CHAR. :—Large deciduous straggling shrub ; branches long ; branchlets clothed with white pubescence ; *L.*—mostly opposite, simple, ovate-lanceolate, velvety above, nigro-punctate beneath, 5-9 × 1·3-2·5 cm., intramarginal nerve prominent beneath ; *Fl.*—numerous, in 2-15 flowered cymes, scarlet. *Fr.*—capsule, 1 cm. long, irregularly dehiscent. *Sd.*—numerous, wedge-shaped, brown, smooth ; *Fl. t.*—Dec.-May.

DISTR. :—Throughout India, Ceylon, Baluchistan, tropical Africa, Madagascar, China, Japan, Java, Sumatra.

DYES and TANS. :—The flowers yield a pink or red colour. They also contain a small amount of yellowish-brown colouring matter. They are employed throughout India in dyeing, either to produce a colour by themselves or as a mordant with Al.

Flowers contain tannin about 25% of Oak-bark tannin. They have been used for tannin to a small extent. Prof. J. J. Hummal has classed the flowers with the best tanning materials. Leaves are commonly used as a tanning material in India.

## WRIGHTIA TINCTORIA R. Br.

FAM. :—Apocynaceæ.

COM. NS. :—*G.* Indrajav, Kalikari ; *H.* Dudhi, Indrajav, Khirni ; *K.* Hale, Hallunova, Kod-murki, Kuda ; *M.* Indrajav, Kala-kuda.

CHAR. :—A small deciduous tree, 6-7·5 m. high, girth ·9-1·2 m. *Bark* scaly, smooth. *L.*—7·5-10 × 2·5-4 cm., elliptic-oblong, acuminate, rounded at the base, entire, membranous, glabrous or occasionally pubescent, or with the margins slightly erosed ; petiole 2-3 lin. long. *Fl.*—white, fragrant, 1·3-2 cm. diam., in lax terminal cymes ;

bracts lanceolate, caducous. Corolla-tube twice the length of calyx. Corona consisting of numerous white linear-scales. *Fr.*—follicles, 25-50 cm. long by 5 lin. diam. *Fl. t.*—Mar.-May. *Fr. t.*—Jan.-Feb. Sheds leaves Feb.; new leaves Mar.-Apr.

DISTR. :—Throughout the State in deciduous forests. Konkan, Matheran, jungles south of Nagothana; Deccan, Khandala, Karla; S. M. Country, Badami. Common on the Toranmal plateau in W. Khandesh, Rajasthan, Madhya Pradesh, W. Peninsula; Ceylon.

DYES and TANS. :—*The seeds are said to be used as an adjunct to* other materials in dyeing. The leaves are used for a blue dye or indigo which is extracted by boiling leaves in water for three hours.

*See*—Medicinal Plants, Fodder Plants, Sacred Plants.

## ZIZYPHUS JUJUBA Lamk.

FAM. :—Rhamnaceæ.

COM. NS. :—*E.* Chinese Date, Indian Cherry-plum; *G.* Ber, Bordi, Boyedi; *H.* Ber, Heri; *K.* Bogari, Bore, Ilanji; *M.* **Bor.**

CHAR. :—A small sub-deciduous tree with dense spreading crown, about 6 m. high, (sometimes 7·5-10 m. high), girth 1·2-2·4 m. *Bark* dark grey, rough, deeply furrowed. Branches armed with spines in pairs, one straight, the other curved. *L.*—alternate, oblong or ovate, minutely serrulate, apex toothed, base oblique nerved, upper surface shining, buff-tomentose beneath. *Fl.*—in dense axillary cymes or fascicles, greenish. *Fr.*—drupe, 1·3-1·7 cm. diam., globose, first yellow, then orange and finally reddish brown; seed one, hard. *Fl. t.*—Mar.-June. *Fr. t.*—Nov.-Jan.

DISTR. :—Throughout the State in dry situations, open dry forests, on poor soils and in rocky places; abundant in the Deccan; on the laterite near the sea-coast in N. Kanara. Indigenous and naturalised throughout India, in the outer Himalayas up to 1,400 cm.; Burma, Ceylon, China, Afghanistan, Africa, Australia.

DYES and TANS. :—The bark is used for tanning purposes in N. India Bombay, Madras and Burma. The bark, leaves and fruits, all contain tannin. In Burma fruit is employed as a mordant in dyeing silk a reddish-pink colour with safflower.

*See*—Medicinal Plants, Fruit Trees, Fodder Plants, Sacred Plants.

## ZIZYPHUS XYLOPYRA Willd.

FAM. :—Rhamnaceæ.

COM. NS. :—*H.* Chittania, Ghout, Kat-ber, Sitaber; *K.* Challe, Mulla-kara; *M.* **Ghat-bori, Kanta-gotti, Guti.**

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CHAR. :—A small tree, 4·5-6 m. high, girth ·6-·9 m. *Bark* grey or reddish-brown, with thick oblong exfoliating scales. Branches, underside of leaves, inflorescence and fruit covered with short greyish tomentum; stipulary thorns generally twin, one straight and the other recurved, always present in a poor soil but often absent in a good one, and especially on younger branches. *L.*—4-8·1 cm. long and nearly as broad, elliptic orbicular or obovate, obtuse at the apex, slightly oblique, rounded or sub-cordate at the base, serrulate, glabrous and dark above, pale and softly pubescent below, shortly petioled. *Fl.*—greenish-yellow, sometimes tetramerous, on short pedunculate compact cymes. Calyx glabrous within; lobes keeled near the apex. Petals very concave, reflexed, on long claws. Disc thin, 5-angled, Ovary 3, rarely 2 or 4-celled. Styles usually 3, divided to near the base. *Fr.*—drupe, usually round, hard, 3, rarely 2 or 4-celled, 1·3-2·5 cm. long, covered with a dense grey or whitish tomentum. *Fl. t.*—Apr.-May. *Fr. t.*—Sept.-Feb., New leaves Apr.-May.

DISTR. :—Common in the moist forests of N. Kanara and Konkan southwards in Western Peninsula. N. W. India, Rajasthan, Madhya Pradesh, Bihar and Oudh; Ceylon, Burma.

DYES and TANS. :—The berry contains a considerable amount of tannin. The bark is also used in Bundelkhand as a tanning agent in company with the leaves of *woodfordia frutisasa.* They are similarly employed in Chota-Nagpur, Bombay and other parts of India.

*See*—Fodder Plants.

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## PLANTS USED AS CONDIMENTS AND SPICES.

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Condiments and Spices.

### ALLIUM SATIVUM Linn.

FAM.—Liliaceæ.

COM. NS. :—*E.* Garlic ; *G.* Lasan ; *H.* Lahsan ; *K.* Bellulli ; *M.* Lasun.

DISTR. :—Widely cultivated in fields throughout India. Cultivated in the irrigated lands of the Deccan and S. M. Country.

USES.:—Garlic is largely used as a condiment or spice in *chutneys,* in seasoning vegetables, in curries and in flavouring pickles. In Europe it is sometimes used for flavouring soups and stews etc. It is also used medicinally . It has a pungent flavour and an over-powering odour which is due to the presence of a volatile oil.

*See* Medicinal plants, Oils.

### ALPINA GALANGA Swartz.

FAM.—Zingideraceæ.

COM. NS. :—*M.* Kulinjan.

CHAR. :—A herb. Rootstock perennial tuberous, slightly aromatic. *L.*—large, oblong-lanceolate green with slightly white margins. *Fl.*—greenish-white in dense-flowered panicles ; the lip obovate, clawed, white veined with red. *Fr.*—size of a small cherry, orange-red.

DISTR. :—Konkan, N. Kanara ; often cultivated throughout India ; Ceylon, Malay Islands.

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USES :—In Malaya rhizomes are used as spice for flavouring curries and fruits as a substitute for cardamoms.

*See* Dyes and Tans.

### BRASSICA ALBA Rabenh.

FAM.—Crucifereæ.

COM. N.S. :—*E.* White mustard ; *H.* Safed Rai.

CHAR. :—A self sterile species with hairy stem. *L.*—irregularly pinnate, *Fl.*—large yellow. *Fr.*—Pods, hairy, spreading, with long beak, few seeded. Seeds large, white, lightly pitted and give considerable amount of mucilage with cold water.

DISTR. :—Occasionally grown in the gardens. Grown as a garden crop in Upper India, during winter. Native of South Europe and Western Asia.

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USES :—Seeds are rarely used alone. They are ground with black mustard in the preparation of the condiment called *.table .mustard.* Leaves, in very young stage, are used as a dry salad with cress.

### BRASSICA JUNCEA Coss.

FAM.—Cruciferеæ.

COM. NS. :—*E.* Mustard; *G.* Rai; *H.* Rai; *K.* Sasive; *M.* Mohri.

CHAR. :—An annual. Stems tinged with purple. *L.*—pinnatifid or sinuate-lyrate. *Fl.*—yellow. Pods long. Seeds many, brown.

DISTR.:—Cultivated all over the State; Ahmedabad and Nasik are the important districts growing mustard.

USES :—The seeds are used in curries and other vegetable preparations.

### BRASSICA NIGRA Koch.

FAM.—Cruciferеæ.

COM. NS. :—*E.* Black Mustard; *G.* Rai; *H.* Rai; *K.* Sasivi; *M.* Mohari.

CHAR. :—A hispid annual. *L.*—stalked, lower lyrate, upper entire. *Fl.*—yellow, racemes moderately long. Pods erect pressed closely to the axis.

DISTR. :—Cultivated in fields all over during the cold season, around wheat or gram fields or mixed with wheat or linseed.

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USES :—Seeds are used in pickles and curries. Black mustard is ground with white mustard for preparing Table mustard.

*See* Medical Plants.

### CAPSICUM ANNUUM Linn.

VAR. ACUMINATA FING.

FAM.—Solanaceæ.

COM. NS. :—*E.* Chillies; *G.* Marchu; *H.* Lalmirich; *K.* Mensinkai; *M.* Mirchi.

CHAR. :—A herbaceous annual or biennial, usually 45-75 cm. *L.*—Smooth, solitary, ovate-acuminate. *Fl.*—Pedicels usually solitary; corolla usually white. *Fr.*—tapering, much longer than broad, usually more or less curved, red, yellow or orange; flesh thin

DISTR. :—Largely cultivated throughout the State; widely cultivated throughout India.

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USES :—This constitutes the principal source of dry chillies of commerce. Dry chillies are extensively used as a spice in India. Curry-powder is made by grinding roasted dry chillies, coriander, cumin and turmeric.

The principle of pungent chillies is *Capsaicin*. It is a very good source of Vitamin C.

### CAPSICUM FRUTESCENS Linn.

FAM.—Solanaceæ.

COM. NS. :—*E.* Bird Chillies ; *G.* Marchu ; *H.* Lankamirchi ; *K.* Mensinkai ; *M.* Lavangi mirchi, Mirchi.

CHAR. :—A shrubby perennial plant, ·6-1·8 m. high ; branches angular. *L.*—broadly-ovate, acuminate, wrinkled, pubescent. *Fl.*—Pedicels usually 2 ; Corolla, white or greenish-white. *Fr.*—red, ovoid, obtuse or oblong acuminate.

DISTR. :—Extensively cultivated in S. M. Country and in the Deccan ; to a small extent in Gujarat and Konkan. Cultivated all over India ; often found as an escape.

USES :—It is the chief element used in curries and most of other dishes. Chillies are extensively used in *chutneys* and pickles. They form a part of the people's daily food. Cayenne-pepper is made from finely ground bird-chillies mixed with salt. Bird-chilli is used in making a hot sauce such as Pepper sauce.

There are several varieties of chillies that are in cultivation and they differ from each other in shape, size, colour of the fruit and the degree of pungency.

*See* Medicinal Plants.

### CARUM COPTICUM Benth.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Bishop's weed ; *G.* Ajamo ; *H.* Ajwain ; *K.* Oma ; *M.* Owa.

CHAR. :—An annual herb. *L.*—sparse, decompound, ultimate segments all linear. Involucres from 4-8. Linear. *Fl.*—white. *Fr.*—ovoid, muricate, ridges distinct.

DISTR. :—Cultivated as a minor crop, chiefly confined to the district of East Khandesh in this State.

USES :—Seeds are aromatic and are used as a condiment or spice in many Indian dishes and is sometimes mixed with *Supari* (Areca nut) for chewing with betel leaf. The main constituent is Thymol.

*See*—Medicinal Plants.

## CARUM ROXBURGHIANUM Benth.

FAM.—Umbelliferew.

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COM. NS. :—*G.* Ajamo ; *H.* Ajawan ; *K.* Ajawan ; *M.* Owa.

CHAR. :—An annual herb, about 90 cm. high, root white, thick. *L.*—2-3 pinnate ; ultimate segments of lower leaves oblong linear, of upper, linear. *Fl.*—in umbels, white, polygamous. *Fr.*—Ovoid, hispid ; ridges distinct.

DISTR. :—Widely cultivated in gardens in Gujarat.

USES :—The aromatic fruits (mericarps) are used for flavouring curries etc. They are also used medicinally. Leaves are used by Europeans as substitute for parsley for seasoning purposes.

## CINNAMOMUM ZEYLANICUM Blume.

FAM.—Lauraceæ.

COM. NS. :—*E.* Wild Cinnamon tree ; *G.* Dalchini, Taj ; *H.* Dalchini, Darchini, Kash ; *K.* Dalchini, Lavange-hakke, Nisane ; *M.* Dalchini.

CHAR. :—A middle-sized evergreen tree ; branchlets compressed, grooved. 9-12 m. high, girth 1·2-1·5 m. *Bark* brown, 1·3-2 cm., thick, rough in very old trees ; inner bark reddish. *L.*—opposite or sub-opposite, 7·5-12·5 × 4-7·5 cm., rigid, more or less coriaceous, elliptic-lanceolate, obtusely pointed at the apex, more or less acuminate and sometimes unequal at the base, glabrous and shining above, glaucous beneath, 3-5 nerved. *Fl.*—tomentose, small, usually hermaphrodite, on long terminal, corymbose panicles equalling the leaves, the ultimate ramifications 3-flowered. *Fl. t.*—Nov.-Mar. *Fr. t.*—June-Aug. Every part of the plant when bruised gives a powerful odour of cinnamon.

DISTR. :—Rain forests, along the ghats from the Konkan southwards. Very common in the N. Kanara district. Western Peninsula, Burma, Ceylon, Malaya Peninsula indigenous and cultivated. Cultivated in the Malaya Islands and elsewhere in the tropics.

USES :—The dried bark (quill) has a delicate fragrance, and has a warm, sweetish agreeable taste. It is largely used as a spice or condiment, either in the form of small bits or as a powder. Powdered cinnamon is a constituent of chocolate preparations made in Spain. It is also used in Candy, gums, incense, dentifrices and perfumes.

*See* Medicinal Plants, Oils.

## CLAUSENA INDICA Oliv.

FAM.—Rutaceæ.

CHAR. :—A small unarmed tree or a large shrub; branchlets slender, puberulous. *Bark* smooth. *L.*—7-11-foliolate, 10·4-26 cm. long, glabrous, common petiole slender, round, glabrous or puberulous. Leaflets, 5·2-10·4 cm., alternate, elliptic or ovate lanceolate, obtuse, notched, acute or obtusely acuminate, very oblique, crenulate, sub-coriaceous, shining, dark and marked with prominent glands on both surfaces when dry. *Fl.*—1·34 cm., diam., pentamerous, glabrous, white, on very short pedicels, in terminal, corymbiform panicles as long as the leaves; peduncle hoary. Petals ovate-oblong, elliptical. Stamens 10, alternate shorter; filaments dilated below and inserted on an elongated disc. Anthers small. Ovary globose or oblong, glabrous, verrucose with pellucid glands, 2-sometimes 3-5 celled. Style deciduous; stigma 4-lobed; *Fr.*—berry, 1·34 cm. diam, globose, yellow, pulpy, 1-2 celled; cells 1-2 seeded, usually 1-seeded. Seeds oblong. *Fl. t.*—Mar. *Fr. t.*—rainy season.

DISTR. :—Konkan, common in the evergreen forests on N. Kanara ghats from Aanshi southwards, Anamalais, Ceylon.

USES :—Leaves are aromatic and are eaten in curries.

## COLEUS AMBOINICUS Lour.

FAM.—Labiatæ.

COM. NS. :—*E.* Country Borage; *H.* Pathur-chur; *M.* Panacha

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CHAR. :—A herb with thick, fleshy, aromatic leaves, and flowers with pale purple corolla.

DISTR. :—Grown everywhere in the gardens in the State.

USES :—All parts of the plant are delightfully fragrant. They form an agreeable, flavoury, cooling drink used in the hot season. The leaves are frequently eaten with bread and butter. *Bhajias* are also made from the leaves.

## CORIANDRUM SATIVUM Linn.

FAM.—Umbellifereæ.

COM. NS. :—*E.* Coriander; *G.* Konphir; *H.* Dhania; *K.* Kothambri; *M.* Kothimbir.

DISTR. :—Extensively cultivated all over the State. It occupies an area of about 40,000 acres; Cultivated throughout India. Widely known from Palestine, Syria, Mesapotamia and Greece,

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USES :—The stem, leaves and fruits have a pleasant aromatic odour. Practically all the parts of the plant are used in the preparation of chutneys and sauces. Leaves are particularly used for flavouring curries and soups. Fruits are extensively used as condiment in the preparation of curry-powder, pickling spices, sausages and seasoning. They are also used for flavouring pastry, cookies, buns, cakes, and tobacco products.

In America and Europe it is employed for flavouring liquors especially Gin.

The leaves and fruits are a good source of Vitamin A.

*See* Medicinal plants, Oils, Vegetables.

## CUMINUM CYMINUM Linn.

FAM.—Umbellifereæ.

COM. NS. :—*E.* Cumin ; *G.* Jiru ; *H.* Zira ; *K.* Jirige ; *M.* Jire.

DISTR. :—Cultivated throughout the State.

USES :—The seeds called *Jire* have an aromatic odour and somewhat spicy, bitter taste. They are extensively used as a condiment. They are used as an essential ingredient in all mixed spices and curry-powders, for flavouring soups, sausages, pickles, and cheese ; also used for seasoning bread and cakes. They are also candied.

*See* Medicinal Plants.

## CURCUMA LONGA Linn.

FAM.—Zingiberaceæ.

COM. NS. :—*E.* Indian saffron, Turmeric ; *G.* Halada ; *H.* Halad *K.* Arishiva ; *M.* Halad.

CHAR. :—A stemless herb ; root stock tuberous, ovoid ; tubers thick, cylindric, bright-yellow inside. *L.*—large oblong with long stalks, *Fl.*—in spikes, crowned by coloured bracts ; flowers funnel shaped, pale yellow.

DISTR. :—Cultivated throughout the State as garden crop in good soil. Area under cultivation is nearly 7000 acres. Satara in the Deccan covers 84 % of the total acreage. Cultivated throughout the tropics.

USES :—Turmeric is used as a spice in form of powder. It forms an important ingredient for flavouring curries and various other preparations.

*See* Medicinal Plants. Dyes and Tans.

## CYMBOPOGON CITRATUS Stapf.

FAM.—Gramineæ.

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**—**
**Condiments and Spices.**

COM. NS. :—*E.* Lemon grass; *G.* Lilicha; *H.* Gandhatrina; *K.* Majjige hullu, Purhati hullu; *M.* Gavati-chaha; *Sk.* Bhustrina, Putigandha, Takratrina.

CHAR. :—A tall perennial, throwing up dense fascicles of leaves from a short rhizome; culm stout, erect, up to over 1·8 m. high; *L.*—linear tapering upwards to a point upto over 90 cm. long; glaucous green, smooth or rough upwards and along the margins midrib whitish on the upper side. Ligule very short; sheaths terete; those of the barren shoots widened and tightly clasping at the base, others narrow and separating; sheaths of the culm tight, velvety at the nodes. *Fl.*—in decompound spatheate panicles 30 to 60 cm. long, nodding.

DISTR. :—The grass is only known in the cultivated state, probably of Indian origin, and now widely distributed over the tropics of both the hemispheres.

USES :—The leaves of the Lemon-grass (*Gavati Chah*) are used in India for flavouring soups and curries.

*See* Oils.

## ELETTERIA CARDAMOMUM Maton.

FAM.—Scitaminaceœ.

COM. NS. :—*E.* Malabar cardamon; *G.* Elchi; *H.* Choti-elchi; *K.* Yalakki; *M.* Veldoda.

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DISTR. :—Cultivated in the Western Valleys of North Kanara.

USES :—The spice consists of the ovoid fruits, or rather the numerous small angular seeds they contain; these have a powerful aromatic odour and flavour. They are used for flavouring sweetmeats, in certain cooked dishes, and in curry powders. They are esteemed for use with masticatories as betel-pan or Supari (Areca nut) or for sweetening the breath. In a sugar-coated state they are much used in Hindoo festivals and ceremonials. They are also used medicinally.

*See* Medicinal plants

## FOENICULUM VULGARE Gaertn.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Fennel, Finkel; *G.* Variari, Vàriali; *H.* Soupa; K. Badisoppu; M. Badishep; Sk. Bhuripushpa, Potika, Shalina, Shateya, Tapaspriya.

CHAR. :—A tall glabrous, dark green, annual, 0·6-0·9 m. high; *L.*—decompound, ultimate segments linear; *Fl.*—in large umbels; bracts and bracteoles absent; yellow. *Fr.*—ellipsoid, ridges prominent, furrows vittate, carpophore 2-partite.

DISTR. :—Apparently a native of S. Europe but now diffused over temperate and sub-tropical regions of the world.

USES :—The aromatic leaves are used in fish sauces. The seeds are eaten with *pan* (betel leaf) or in curries.

*See* Oils.

### GARCINIA INDICA Chois.

FAM.—Guttiferæ.

COM. NS. :—*E.* Wild-mangosteen; *G.* Kokam; *H.* Kokum; *K.* Murgal; *M.* Bhirand, Ratamba, Kokamb.

CHAR. :—A tall slender tree with drooping branches. *Bark* light brown, spiny, very thin, smooth. *L.*—8·13-8·54 cm., obovate or lanceolate, obtuse, acute or acuminate, dark green, red when young. *Fl.*—yellowish. *Male* in axillary and terminal fascicles on pedicels 2·6-4 cm. Sepals orbicular. Petals rather larger. Stamens 12-20, forming a short capitate column; anthers opening longitudinally. *Female* solitary and terminal on a thick peduncle. Stamindoes arranged in 4 bundles. Ovary 4-8 celled; stigma usually 8-lobed. *Fr.*—deep-purple, globose, as large as a small orange, not furrowed, 4-8 seeded. *Fl. t.*—Nov.-Feb. *Fr. t.*—Apr.-May.

DISTR. :—Tropical rain forests; Western coasts and W. ghats; Matheran; common in S. Konkan and N. Kanara evergreen in Mauritius.

USES :—The tree yields a red coloured fruit. The dried rind of the fruit, called *Amsul,* is largely used in Konkan as an ingredient in curries, taking the place of tamarind. From the fresh pulp of the ripe fruit, a sharbat is prepared; it makes a cooling drink.

*See* Medicinal Plants.

### MENTHA ARVENSIS Linn.

FAM.—Labiatæ.

COM. NS. :—*E.* Corn-March mint; *G.* Pudina; *H.* Pudinah; *K.* Chatinmaragu; *M.* Pudina.

CHAR. :—A perennial erect herb; stem short, hairy. *L.*—narrowed below, stalked, ovate, oblong, lanceolate, toothed; the upper similar and large; *Fl.*—in axillary distant whorls, none at the top. *C.*—subequally 4-lobed, lilac, lined with hairs and hairy outside. Fr.—nutlets dry, smooth.

DISTR. :—Western Himalayas, Kashmir, Europe, North and West Asia, China.

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USES :—Leaves of the marsh-mint (Pudina) are aromatic and they are used in flavouring chutneys etc.

*See* Oils.

### MENTHA PIPERITA Linn.

FAM.—Labiatæ.

COM. NS. :—*E.* Peppermint.

CHAR. :—Aromatic herb with reddish branched stem. Leaves ovate-oblong. Flowers purple in short loose spikes.

DISTR. :—Grown in gardens in the state.

USES :—The aromatic leaves of peppermint are used for making culinary and confectionary.

### MENTHA VIRIDIS Linn.

FAM.—Labiatæ.

COM. NS. :—*E.* Green Mint, Spear Mint; *M.* Pudina.

CHAR. :—A herb. *L.*—aromatic, ovate-lanceolate, serrate. *Fl.*—purplish.

DISTR. :—Commonly grown in gardens in the State and throughout the plains of India.

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USES :—The aromatic leaves of the spear-mint (also called *Pudina*) are used in flavouring chutneys, curries etc.

### MURRAYA KOENIGI Spreng.

FAM.—Rutaceæ.

COM. NS. :—*E.* Curry-leaf tree; *H.* Harri, Gandhla, Katnim; *K.* Kuri-bevu; *M.* Kadhi-nimb, Kudia-nimb, Poospala.

CHAR. :—A small unarmed, evergreen tree, 4·5-6 m. high, girth ·45-·6 m. *Bark* grey with shallow netted fissures. *L.*—about ·3 cm. long; 11-21 foliolate, pubescent or glabrous. Petiole slender, round, pubescent, not winged. Leaflets 2·6-4 cm., shortly petioluled, alternate ovate-lanceolate, obtusely acuminate slightly emarginate, usually oblique at the base, crenulate. *Fl.*—white, fragrant, small, ebracteate, in dense terminal corymbiform panicles. Sepals 5, acute, persistent. Petals 5, oblong-lanceolate, acute or obtuse, about ·2-4 lin. long, dotted. Stamens 10, alternately longer. Filaments dilated below, and inserted around the elongated disc. Anthers small. Ovary 2-celled. Style short, thick; stigma capitate. *Fr.*—berry, ovoid or sub-globose, size of a small pea. 1-2 seeded, bluish-black, rugose. Seeds imbedded in mucilage. *Fl. t.*—hot season. *Fr. t.*—June onwards.

DISTR. :—Common in the moist evergreen forests of the Konkan and N. Kanara; forms a large proportion of the undergrowth in some of the high timber deciduous forests of the Supa sub-division in N. Kanara. Found wild at Mahabaleshwar and Matheran. Malabar, Travancore, Madras, Bengal, foot of the Himalayas from Garhwal to Sikkim. Pegu, Ceylon. Often cultivated.

USES :—The leaves of *Kadhi-nimb* are odouriferous. They are used either fresh or dry to flavour curries and chutneys.

*See* Oils.

## MYRISTICA MALABARICA Lamk.

FAM.—Myristicaceæ.

COM. NS. :—*E.* False Nutmeg; *K.* Kanagi, Rampatri; *M.* Jangali or Ran Jaiphal, Kaiphal.

CHAR. :—A large, elegant, evergreen tree. *Bark* smooth, with small lenticular spots; the inner bark with much red juice. *L.*—10-20 × 4-6·8 cm., narrow, oblong or elliptic, lanceolate, acute or obtuse at the apex, acute or rounded at the base, glabrous on both sides, dull-coloured above, dull-brown or whitish beneath, petiole channelled above. *Male fl.*—more numerous and smaller than female ones on axillary cymes, 2·5-7·5 cm., perianth sub-globose, 3-4 cleft at the apex. Anthers 10-15, covering more than three-fourths of the column. *Female* peduncles axillary, usually simple bearing 3-6 flowers. *Fr.*—6·8-7·5 × 1·3-2·6 cm. oblong. Aril orange-red, lobes twisted and folded into a cone at the top. *Fl. t.*—Nov.-Mar. *Fr. t.*—cold and hot season. Fruit remaining for a long time on the tree.

DISTR. :—In the evergreen forests of the Konkan and the N. Kanara ghats. Common in the Mukta taluka forests, Malabar.

USES :—The yellowish mace (*Rampatri*) – aril surrounding the fruit – Malabar nutmeg (*Kaiphal*) and the nutmeg (*Kaiphal*) are used as aromatic species and are also used for adulterating the true mace (*Jayapatri*), and true nutmeg (*Jayaphal*) the products of Myristica fragrans.

*See* Medicinal Plants, Oils, Gums & Resins.

## OCIMOM BASILICUM Linn.

FAM.—Labiateæ.

COM. NS. :—*E.* Common sweet basil; *G.* Damaro, Nasabo, Sabja; *H.* Bahari, Barbar, Rihan, Sabzah; *K.* Ramkasturi, Sajjebija; *M.* Sabja, Tukhamaria; *Sk.* Ajagandhika, Barbar, Surabhi, Surasa, Tungi, Manjarki.

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CHAR. :—An erect herb 0·6-0·9 m. high; glabrous or hispidly pubescent; stems and branches green or purplish; *L.*—ovate, acute, entire, toother or lobed; *Fl.*—in whorled racemes; terminal raceme longer than the lateral; bracts stalked; *C.*—2-lipped, 8-13 mm. long, white, pink or purplish, glabrous or pubescent. *Fr.*—nutlets about 2 mm. long, ellipsoid, black, and pitted.

DISTR. :—Indigenous on the lower hills of the Punjab; cultivated throughout the greater part of India, Ceylon, Burma.

USES :—The plant has a strong aromatic flavour and is often used for culinary purposes as a seasoning. Seeds infused in water form a cooling and refreshing drink much liked by the Muslims.

*See* Oils, Fibres.

## PETROSELINUM SATIYUM Hoffm.

FAM.—Umbelliferæ.

COM. NS. :—*E.* Parsley.

CHAR. :—A glabrous biennial or short-lived perennial, 45-75 cm. high; stem much branched. *L.*—decompound ultimate segments cuneate—ovate, stalked and deeply cut, curled and crisped. *Fl.*—small, greenish-yellow in compound umbels. *Fr.*—very small, conspicuously ribbed.

DISTR. :—Cultivated in gardens in the State; said to be a native of Sardinia; believed to be wild in the Mediterranean region.

USES :—The leaves are in great demand for garnishing and also for flavouring in numerous culinary preparations.

## PEUCEDANUM GRAVEOLENS Benth.

FAM.—Umbelliufereæ.

COM. NS. :—*E.* Anet, Dill; *G.* Suah, Surva; *H.* Sowa, Sutapoha; *K.* Sabbasiga; *M.* Balantshopa, Shopha; *Sk.* Avakapushi, Shatapushpa, Shophaka, Vajana.

CHAR. :—A glabrous perennial herb, 30-90 cm. high; *L.*—2-3 pinnate, ultimate segments linear; bracts and bracteoles; *Fl.*—in compound umbels, yellow. *Fr.*—4 × 2 cm., narrowly winged, dorsal intermediate, ridges distinct, vittæ large, solitary in each furrow, 2 on the commissure.

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DISTR. :—Throughout tropical and sub-tropical India, often cultivated; cultivated in South Europe and Western Asia.

USES :—The seed (*Balantshopa*) are odouriferous and are used as in ingredient for flavouring curries and other culinary preparations; used also medicinally.

### PIPER BETLE Linn.

FAM.—Piperaceæ.

COM. NS. :—*E.* Betel-leaf vine, Betal-peppar ;*G.* Pan; *H.* Pan; *K.* Eleballi, Pann; *M.* Vidyache pan.

CHAR. :—A perennial climber with entire large leaves with 5-7 nerves, and minute, unisexual flowers (male and female on different plants) in cylindric pendulous spikes.

DISTR. :—Cultivated chiefly in Dharwar, Poona, Satara, Sholapur, Thana and Kanara districts of the State; total area being about 6000 acres cultivated in hotter and damper parts of India and Ceylon.

USES :—Fresh leaves are aromatic and they are used as a masticatory together with *Supari* (Areca nut). The spicy burning taste of the leaves is due to the presence of a volatile oil. The leaves are said to be rich in vitamins 'B' and 'C'.

*See* Medicinal Plans.

### PIPER NIGRUM Linn.

FAM.—Piperaceæ.

COM. NS. :—*E.* Black-pepper; *G.* Kalamiri; *H.* Golmirich; *K.* Menasu; *M.* Kalemiri.

CHAR. :—A stout smooth climber. *L.*—Leathery, usually broadly ovate, base rounded and oblique, 5-9 nerved. *Fl.*—minute, polygamous; *Fr.*—Small, red in loose interruped spikes, pulp thin.

DISTR. :—Wild in N. Kanara forests, cultivated in Konkan and N. Kanara; cultivated in the tropics, generally Ceylon.

USES :—The plants furnish the black and white peppers of commerce. Black pepper is used as a spice in curries, sauces, soups, etc. White pepper is used in medicine. The use of pepper as a spice dates from early times, it being mentioned by Theophrostus in the 4th century. In the middle ages it was highly valued, and Venice, Genoa etc. owed much of their wealth to the trade in this spice.

*See* Medicinal plants.

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## TAMARINDUS INDICA Linn.

FAM.—Caesalpinioideæ.

COM. NS. :—*E.* Tamarind; *G.* Amli; *H.* Amli, Imli, Nuli, Teter; *K.* Amla, Amlike, Hunase; *M.* Chinch.

CHAR. :—A large evergreen tree 12-18 m. high, *Bark* 1·3 m. thick, dark-grey, with longitudinal fissures and horizontal cracks. *L.*—abruptly pinnate, 5-12 cm. long; rachis channelled; leaflets subsessile, 10-20 pairs, closely set. *Fl.*—in lax few-flowered racemes at the end of branchlets; corolla petals 3 (one upper and 2 lateral), subequal, yellowish with pink stripes; stamens 3 fertile. *Fr.*—pod, 7·5-20 × 2·5 cm., 1 cm. thick, slightly curved, scurfy, seeds 3-12, obovate-oblong, truncate ends with a shallow oblong pit on each of the flat faces, brown, shining. *Fl. t.*—Apr.-June. *Fr. t.*—ripe Feb.-Mar.

DISTR.—Evergreen forests of Konkan and N. Kanara; shady parts of rain forests. Self-sown near villages and in waste lands, also cultivated throughout the State. Throughout India and Tropics, generally, indigenous in tropical Central Africa.

USES :—The fleshy merscarp of the pods is extensively used as a condiment and spice in curries and vegetables. The pulp of the fruit is salted after removing the stingy veims and stored in almost every house for this purpose. The pulp of the fruit, when mixed with sugar and water makes a cooling drink.

The seeds are utilised for preparing a sizing largely in the textile industry. It is an important source of pectin.

*See* Medicinal Plants, Fruit Trees, Famine Plants, Dyes and Tans., Gums and Resins.

## TRIGONELLA FOENUM-GRAECUM Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Fenugreek; *G.* Methi, Methini; *H.* Methi, Muthi, *K.* Menthe-palle; *M.* Methi.

CHAR. :—An annual erect herb. *L.*—pinnately trifoliate; leaflets toothed. *Fl.*—1 to 2, sessile, in the axils of the leaves, yellow. *Fr.*—Pod, 10-20 seeded with a long persistent beak

DISTR. :—Cultivated. Grown in garden lands at all times all over the State; cultivated in many parts of India; extending through Iran and Abyssinia to the Mediterranean.

USES :—The small brown aromatic seeds are largely used as a condiment to flavour curries. They are also used in spices. The leaves are used as a vegetable.

*See* Medicinal Plants. Vegetables, Fodder Plants.

## ZINGIBER OFFICINALE Rose.

FAM.—Zingiberaceæ.

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**Condiments and Spices.**

COM. NS. :—*E*. Ginger ; *G*. Alen ; *H*. Adrate, Ada, *K*. Ala, Adrak, Hasisunthi ; *M*. Ale.

CHAR. :—A herb with horizontal tuberous branched root stock. *L*.—Linear lanceolate ; *Fl*.—Peduncles long ; spikes oblong, flowers small, lip and stamen of a dark purple colour.

DISTR. :—Cultivated extensively in the Deccan and Gujarat. Widely cultivated in tropical Asia.

USES :—Green ginger and *Sunth* are used as condiments or spice in curries, soups, puddings, pickles and in gingerbeer. Used also medicinally.

*See* Medicinal Plants.

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## PLANTS YIELDING GUMS AND RESINS.

### ACACIA ARABICA Willd.

FAM.—Mimosaceæ.

**SECTION 5.**

**Gums and Resins.**

COM. NS. :—*E.* Babul, Indian Gum Arabic; *H.* Babul, Basus; *K.* Gobli, Jali, Jaligida; *M.* Babhul, Babul; *Tr.* Babul.

CHAR.—A moderate-sized or a large tree. *Bark* dark-brown or black, longitudinally fissured. *Branches* thorny. *Spines* 6·5 cm. long, large, white, often with brown points, straight, somewhat ascending. *L.*—rachis downy with several cup-shaped glands; pinnæ generally 6-12, 1·3-4 cm. long; leaflets 20-40, linear, membranous, ·6 cm., glabrous or downy. *Fl.*—yellow, in globose heads. Peduncles slender, grey-downy, with bracts in the middle, 3-6 fasciculate. Corolla campanulate, twice the length of the calyx. *Fr.*— pod, coriaceous, densely grey-downy, stalked, 7·5-10 cm. × 1·3 cm. moniliform, 8-12 seeded. *Fl. t.*—June-Jan. (rainy season). *Fr. t.*—cold season.

There are two varieties. *Var. cupressiformis* Stew-branches erect, like a cypress in growth, called *Ram-Kanta. Var. vediana*—bark more deeply cracked, crown formed of twisted angular branches; spine white; stout; pods flat, called *Vedi-babul.*

DISTR. :—Throughout the dry districts of the State; forms extensive forests in the black-soil country of the State proper. Indigenous in Gujarat and N. Deccan, Punjab, Bihar, Rajasthan, Western Peninsula, Ceylon, Arabia, Egypt, Tropical Africa, Natal.

GUMS & RESINS :—The Indian *gum arabic* or babul gum is a product of great commercial value in India. The gum exudes naturally from the wounds in the bark about March and forms into irregular tear drops about half an inch long and varying in colour from pale straw colour to dark reddish brown or almost black. Old trees yield no gum. A mature tree produces about 2 lbs. of gum each year. The gum from the young trees is lighter in colour and is considered more valuable. It is completely soluble in water. It is used for a variety of purposes, as a mucilage in calico-printing and sizing paper, or as an ingredient in making up white washes, paints, and mortar. It is also used in medicine. It is used extensively in India in the preparation of sweetmeats after frying in ghee. For certain colours mixure of the gum with *dhavda* (*Anogeissus latifolia*) gum is regarded most serviceable and used to stiffen dyed fabrics and to give them a polish. To a certain extent it is used as an indifferent substitute for true gum arabic. The collection of the gum is entirely in the hands of ignorant people and

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Gums and Resins.

the crude material consisting of mixture of various gums reaches Bombay from all parts of the country. The gum, although called gum arabic, is not the true gum arabic.

*See* Medicinal Plants, Dyes and Tans., Fodder Plants.

### ACACIA FARNESIANA Willd.

FAM.—Mimosaceæ.

COM. NS. —*E.* Eassie Flower, Spongy Tree, Stinking Acacia; *G.* Gandhelokhair, Jheribavul; *H.* Passibabal, Vilayati Kikar; *K.* Jali, Karejali; *M.* Devababhul, Kankri.

CHAR. :—A throny shrub or a low tree, 6-7·5 m. high; girth 3-6 m. *Bark* light brown, rough, *Branches* slender, zigzag, marked with grey or pale-brown dots. *Spines* stipular, straight. Common petiole 4-5 cm. *L.* 2-pinnate, 2·5-5 cm. long, pinnæ 4-8 pairs; cup-shaped glands below the lowest and often at the base of the uppermost pair; leaflets 10-20 pairs. *Fl.*—bright-yellow, sweet-scented, in globose faciculate heads. *Fr.*—pods, nearly cylindric, 5-9 cm., turgid, brown, slightly curved, pointed at the ends, dehiscent, glabrous, valves with raised parallel lines. Seeds embedded in dry spongy tissue. *Fl. t.*—Jan.-Mar. *Fr. t.*—in rainy season.

DISTR. :—Cosmopolitan in the tropics, but usually cultivated. Run wild near villages and in moist situations throughout the State; common in the eastern parts and in black-soil *nalas* of the Deccan, Sind.

GUMS & RESINS :—Gums exudes from the trunk in considerable quantities and is considered superior to gum *arabic* in the arts and medicine. It is used to adulterate gum *arabic.*

*See*—Dyes & Tans, Fodder .Plants, Oils, .Food Plants, Medicinal Plants.

### ACACIA FERRUGINEA DC.

FAM. s—Mimosaceœ.

COM. NS. :—*G.* Khaiger; *K.* Banni; *M.* Pandhra Khair.

CHAR. :—A large deciduous tree, 7·5-12 m. high. *Bark* 1·3 cm. thick, rough, dark coloured. *Spines* short, hooked, twin, infrapetiolary; sometimes absent. *L.*—rachis with one small circular or linear gland on the common petiole, and one between the uppermost pinnae. Pinnae 6-12, 5-7·5 cm. long., leaflets 20-60, glaucous, rigid, subcoriaceous. *Fl.*—Yellowish in dense axillary spikes, 10-12·5 cm. long. Corolla very small. *Fr.*—pod, 7·5-10·2 cm., dark brown, glabrous veined, 4-6 seeded, the upper suture narrowly winged.

DISTR. :—Forests of Konkan, Dangs and Gujarat (Panch Mahals). Western Peninsula, N. Bengal, Madhya Bharat.

GUMS & RESINS :—The tree yields a good gum similar to gum *arabic*.

### ACACIA JACQUEMONTI Benth.

FAM.—Mimosaceæ.

COM. NS. :—*G.* :—Ratobaval.

CHAR. :—A bushy thorny shrub ; branches stiff, brown. *L.* :—2-pinnate, stipular spines straight, ivory white ; pinnae 2-4 pairs ; leaflets 5-10 pairs. *Fl.* :—yellow, in globose heads, delightfully fragrant. Pod flat, straight, transversely veined. Seeds 5-6.

DISTR. :—Gujarat—Ahmedabad, Baroda ; Punjab ; Sind, Baluchistan.

GUMS & RESINS :—Tree yields a very good gum, which is said to be very suitable for confectioners' requirements.

*See* Dyes & Tans, Fodder Plants.

### ACACIA LEUCOPHLEA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*E.* White-barked Acacia ; *G.* Haribaval ; *H.* Thind, Karir, Nimber, Safedkika ; *K.* Bili-jali, Naibela, Topal ; *M.* Hivar.

CHAR. :—A moderate-sized or large deciduous tree, 7·5-15 m. high, girth 1·2-1·8 m. In dry places is reduced to a small bushy tree. *Bark* thick, pale yellowish-white and smooth when young ; dark-brown, almost black and rough when old ; exfoliating in patches and stripes. Branchlets, leaves, petioles and branches of inflorescence grey-downy. *Spines* ·6-2·5 cm., stipular, straight. Petiole with several cup-shaped glands. *L.*—pinnae 12·24, 2·5-4 cm. long ; leaflets 30-60, rigid, coriaceous, obliquely oblong obtuse. *Fl.*—small, pale-yellowish, nearly white, in globose heads, not more than ·6 cm. diam., disposed in terminal leafless, about 30 cm. long panicles ; peduncles short with 2 bracts. *Fr.*—pod. 10-20 × ·6-·8 cm., sessile, slightly twisted, clothed with pale-brown or grey tomentum. Seeds 8-12. *Fl. t.*—Aug.-Nov. (sometimes as early as May). *Fr. t.*—Nov.-Apr.

DISTR. :—Throughout the dry Deccan districts ; common in the S. M. Country and Sholapur, in dry open forests, plains of the Punjab and U. Pradesh : Ceylon and Burma.

GUMS & RESINS :—Gum is yielded by the plant which is used in native medicine.

*See* Fibres, Dyes and Tans. : Famine Plants.

## ACACIA CATECHU Willd.

FAM.—Mimosaceæ.

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COM. NS. :—*E.* Black pegu catechu, Cutch; *G.* Kher, Kherio, Khiriobaval; *H.* Katha, Khair, Khair-babul; *K.* Kachu, Kaggali, Kanti; *M.* Khair, Lalkhair; *Sk.* Dantadhavan; Khadira, Kushthari, Saradruma, Yajnika.

DISTR. :—Rajastan, Western Peninsula, Himalayas up to 1700 m., Sikkim, Pegu, Burma, Ceylon.

GUMS & RESINS :—The plant yields a pale yellow gum, often occuring in tears. It is sweet and soluble in water. It forms a thick, clear mucilage and is a better substitute for gum *arabic* used medicinally. A large portion of the gum arabic sold in S. Indian markets is said to be actually *khair* gum.

*See* Medicinal Plants, Dyes and Tans.

## ADENANTHERA PAVONINA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Red Wood; *G.* Bari-gumchi; *K.* Manjadi, Manjuti; *M.* Val, Mothi Gunja, Thorli Gunja.

CHAR. :—A deciduous unarmed tree, 15-18 m. high; girth 1·2-1·8 m. *Bark* grey. *L.*—abruptly bipinnate, 30-60 cm. long., pinnæ 4-6 pair, opposite, short-peduncled, 10-20 cm. long; leaflets 4-12 pairs, oblong, alternate, 1·5-3·75 cm. long on very short petiolules. *Fl.*—small, yellow, faintly fragrant, short-peduncled racemes, 5-15 cm. long, simple from the exils of the leaves and panicled at the end of the branches. *Fr.*—pod, 15-23 × 1·3 cm., twisted, 10-12 seeded. Seeds scarlet red, shining, convex on both sides. *Fl. t.*—Mar.-May. *Fr. t.*—Aug-Oct.

DISTR. :—Wild and planted. In the moist forests of Konkan and N. Kanara, nowhere abundant; Gujarat, Khandesh, S. India, Bengal, Sikkim, Burma.

GUMS & RESINS :—The tree yields a gum which is known as *Madatiya.*

*See* Oils, Dyes and Tans.

## AEGLE MARMELOS Corr.

FAM.—Rutaceæ.

COM. NS. :—*E.* The Bael tree, Bengal Quince; *H.* Bel, Bili *K.* Bela, Baelpatri, Bilapatri; *M.* Bel

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CHAR. :—A small or moderate-sized tree, armed with axillary, straight, strong thorns 2·6 cm. long, 9-12 m. high and girth about ·9-1·2 m. *Bark* 1·34 cm. thick, light cinerous grey, soft, corky, exfoliating in irregular flakes. *L.*—3-foliolate, alternate. Leaflets 3 (very rarely 5), oblong or broadly ovate-lanceolate acute, or obtusely acuminate, crenulate, membranous, inconspicuously pellucid-punctate, the later ones smaller and almost sessile, the terminal ones much larger, 5·2-5·9 × 3·6 cm., long petioluled. *Fl.*—3·2 cm. diam., greenish-white, sweet-scented, on long-slender pubescent, pedicels, forming axillary puberulous racemes. Calyx pubescent, deciduous. Petals oblong, coriaceous, thickly dotted, imbricate. Stamens numerous 30-40. Filaments distinct, subulate, inserted round a small disc. Anthers linear-oblong. Ovary ovoid, 8-20 celled; cells near the circumference. Style short; stigma capitate or oblong, deciduous. *Fr.*—woody, globose, oblong or sometimes pyriform, 5·2-13 cm. diam., smooth, grey or yellow. Seeds numerous, oblong, woolly imbedded in a thick, sweet, aromatic, orange-coloured pulp. *Fl. t.*—rainy-season. Sheds leaves — Mar.-Apr.; new foliage at the end of hot season. A specimen with 7 and 9 leaflets has been observed in one of the houses in the city of Poona.

DISTR.:—Wild in Gujarat and the Deccan, Konkan; through out India in dry places, wild or cultivated; often cultivated near temples; Sub-Himalayan tract from the Jhelum eastwards: Burma.

GUMS & RESINS :—The stem yields a good gum, occuring in tears like gum arabic or in fragmentary pieces resembling coarse brown sugar. From the seeds mucus fluid is secreted within the cells of the fruit, which hardens into a tasteless gummy substance. When mixed with lime it acts as a very good cement for mending porcelain ware.

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*See* Medicinal Plants, Dyes and Tans, Fodder Plants.

## AILANTHUS EXCELSA Roxb.

FAM.—Simarubeaceæ.

COM. NS. :—*G.* Moto-aduso; *H.* & *M.* Maha-ruk, Varul; *K.* Doddamara, Bend-hebberu, Helbevu.

CHAR. :—A handsome large tree, 18-24 m. high. *Bark* light greyish-brown, fibrous or granular, rough. *L.*—abruptly pinnate, ·3-·5 m. long; young ones more or less villous, old glabrous. Leaflets nearly opposite, 8-13 pair, 5·2-10 × 4-5·2 cm., ovate, often broad falcate-lanceolate, acuminate at the apex, very unequal' at the base, long-petioled, coarsely and deeply toothed, often lobed. *Fl.*—yellowish, polygamous, small, about 3 lin, diam., on slender longish pedicels, arranged in axillary, large, often very much branched panicles. Petals glabrous within ovate-lanceolate, usually

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reflexed. Stamens in male flowers 10 (in the hermaphrodite 2-3). Ovary rudimentary or none. Stamens in *female flowers* abortive, Ovary 2-5-partite. *Fr.*—of 1-5, 1-seeded samaras, wing large membranous. Seed pendulous. *Fl. t.*—Feb.-Apr. *Fr. t.*—end of hot season. Sheds leaves during cold season; new foliage Mar.-Apr.

DISTR. :—Common in Gujarat (Broach, Baroda), Khandesh, the Deccan (Bijapur district). From the Ganges downwards to Madhya Bharat, S. India, W. Peninsula; occasionally in Rajasthan, Ceylon; often cultivated.

GUMS & RESINS :—A red gum is obtained from this plant. It resembles moringa, (Moringa oleifera) gum and consists of large rounded tears. It is an inferior type of Bassora gum.

*See* Medicinal Plants.

## AILANTHUS MALABARICA DC.

FAM.—Simarubeaceæ.

COM. NS. :—*K.* Bagadhup, Gugguldhup, Muddhedhup.

CHAR. :—A large deciduous tree, 18-24 m. high, sometimes 30 m., 1-2 m. diameter. *Bark* grey, thick, rough, often studded with bright reddish grains of resin. *L.*—40-44 cm. long, unequally pinnate, quite glabrous. Leaflets 6-10, 7·8-18·2 × 4 cm., sub-opposite or opposite, distant, long, acuminate, the base and two sides very unequal; margin often thickened and undulated, almost entire, coriaceous, shining above, pale beneath. Petioles long; petiolules 3-4 lin. *Fl.*—small, white, on small, pubescent pedicels, forming large terminal panicles, nearly as long as the leaves. Calyx slightly pubescent and ciliate. Petals nearly 3 lin. long, slightly imbricate at the edges. Disc 10-lobed with a minute rudimentary 3-lobed ovary in the male flower. Stamens much longer than corolla *Female fl.*—with 10 sterile stamens, alternately shorter. *Fr.*—samara, oblong, reddish, obtuse at both ends, veined, not twisted. *Fl. t.*—Feb.-Mar. *Fr. t.*—end of hot season. Sheds leaves in hot season.

DISTR. :—Throuhout the Konkan and N. Kanara in evergreen forests, from the sea-level upwards. Common in forests of W. Ghats down to Cape-Comorin. Often planted in S. India, Ceylon, Burma, Indo-China.

GUMS & RESINS :—On incision the bark yields a dark coloured, soft resin known as *Mattipal*, which in time hardens into a brittle resin with strong balsamic odour. It readily dissolves in alcohol. When burnt it gives out a fragrance, some times used as incense for burning in Indian temples; it forms an ingredient of Agarbatti (scented sticks). The peculiar consistancy of the resin would enable it to substitute Venice turpentine for many purposes. It is also used medicinally.

## ALBIZZIA AMRA Boiv.

FAM.—Mimosaceæ.

COM. NS. :—*K.* Bel-Khambi, Tugli ; *M.* Lullei.

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CHAR. :—A middle-sized, much-branched, unarmed deciduous tree. *Bark* dark coloured, smooth, thin, scaly. Branchlets, petioles and inflorescence densely pubescent. *L.*—common rachis 5-10 cm., with one small circular gland below the pinnæ, and one above, at the insertion of one pair of the pinnae. Pinnae 8-20, 2·5-7·5 cm., leaflets 30-60, membranous, ssesile, caducous, glaucous beneath, the midrib nearly in the middle. *Fl.*—yellow, fragrant in heads, on numerous peduncles, crowded in the axils of the uppermost much reduced leaves. Calyx minute. Corolla three times the length of the calyx. *Fr.*—legume, 10-15 × 2·5 cm., pale-brown, 6-10 seeded. *Fl. t.*—Apr.-June. *Fr. t.*—Sept.-Oct.

DISTR. :—Throughout the State in dry forests ; common at Mahabaleshwar in ravines, on the banks of the Krishna, Matheran, S. M. Country (hills near Belgaum). Western Peninsula, Ceylon, E. Tropical Africa.

GUMS & RESINS :—The tree yields a good gum not very much used.

## ALBIZZIA ODORATISSIMA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Kalo-serasio ; *H.* Bersa, Bhandir, 'Kaliasiris, Siran ; *K.* Bilawar, Bilkumbhi, Godhunchi, Pulibaghi ; *M.* Borhi-Chichanda Kala Siris ; *Tr.* Black Siris.

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CHAR. :—A tall unarmed, almost evergreen tree, 9-12 m. high (in favourable conditions higer) ; girth 1·5-1·8 m. *Bark* grey with irregular cracks and darker patches, granular, 1·3 cm. thick, inner bark purple, fibrous. Branchlets, petioles, inflorescence and under side of the leaves finely downy. *L.*—common petiole 15-30 cm. long, with a gland at the base, and of the 1-2 upper pinnae. Pinnae 6-16, 10-15 cm., leaflets 16-50, oblong, unequal-sided, rigid, glaucous beneath, with the midrib parallel with the upper edge at a short distance from it. *Fl.*—pale-yellow, fragrant. Heads few-flowered, very numerous ; peduncles disposed in corymbose panicles, terminal or from the upper leaf-axils. Calyx very small, about five times shorter than grey-silky corolla. *Fr.*—legume, 15·20 × 2·5-4 cm., firm opaque or glossy, 8-12 seeded. *Fl. t.*—Apr.-June. *Fr. t.*—rainy season.

DISTR. :—Common in the moist forests of N. Kanara and the Konkan ; also in the dry Deccan. Sub-Himalayan regions from the Indus eastwards ascending to 900 m. ; Assam, Southern India, Madhya Bharat : Burma.

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GUMS & RESINS :—The tree yields a dark brown gum in rounded tears. It is tasteless.

*See* Fodder Plants.

## ALBIZZIA PROCERA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E.* White-Siris; *H.* Garso, Gurbari, Karanji, Karo Safed-Siris; *K.* Bellati, Chikul, Salaindi; *M.* Gurar, Kinhai; *Tr.* White-Siris.

CHAR. :—A large deciduous unarmed tree, 18-24 m. high (in favourable places 30 m.); girth 1·8-2·7 m. or more. *Bark* 1·3 cm. thick, yellowish or greenish-white or grey, smooth, with horizontal lines. Tender leaves downy. *L.*—common petiole 15-30 cm. with a large, brown, oblong gland near the base. Pinnae 4-12; leaflets 12-24, short-petioled, sub-coriaceous, rigid, obtuse, 2·5-4 cm., obliquely truncate at the base. *Fl.*—yellowish-white, borne on peduncles 2·5 cm. long in fascicles of 2-5, arranged into more or less ample terminal panicles. *Fr.*—Legume, 15-23 × 2-2·5 cm., thin, reddish-brown, dehiscent, 8-12-seeded. *Fl. t.*—May-June. *Fr. t.*—Jan.-Feb.

DISTR. :—Throughout the State; common in the N. Kanara and the Konkan moist forests, in the dry districts along ravines and *nalas*, central and eastern Himalayas, Western Penisula, Burma, Malaya, Archipelago.

GUMS & RESINS :—The tree yields large quantities of gum.

*See* Dyes & Tans, Fodder Plants.

## ALBIZZIA STIPULATA Boiv.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Shambar; *H.* Kanujerla, Pathia, Samsundra, Siran; *K.* Bangana, Hote or Kalbege; *M.* Kasir, Laeli Udul.

CHAR. :—A large unarmed evergreen tree, 18-24 m. high, girth 2·4-3·6 m. *Bark* grey with numerous short vertical wrinkles and a few horizontal furrows, with prominent edges, darker when old. Branchlets, petioles and inflorescence tomentose or downy. *L.*—common petiole 15-30 cm., with large gland near the base, and several smaller ones between the pinnae. Pinnae 12-40, 10-12·5 cm.; leaflets 40-80, membranous, sensitive, sessile, glaucous beneath, broader at the base, acute at the apex. Stipules large, cordate, acute, membranous, velvety, pubescent. *Fl.*—yellowish, inodorous, almost sessile; stamens pink. Heads on 1·3-2·5 cm. downy peduncles, clustered or racemose disposed in terminal panicles. Calyx very small, funnel-shaped. Corolla three times longer. *Fr.*—legume, 12·5-15 × 2-2·5 cm., flat, indehiscent, pale-brown, 8-10 seeded. *Fl. t.*—Apr.-June. *Fr. t.*—Sept.-Oct.

DISTR. :—Common in the evergreen forests of the Konkan and N. Kanara ghats. (Matheran, Khandala, Mahabaleshwar). S. M. Country; tropical Himalaya; Ceylon, Burma.

GUMS & RESINS :—The tree gives a copious gum from the stem which is used in Nepal for sizing *Daphne* paper.

*See* Fodder Plants.

## ALEURITES MOLUCCANA Willd.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Belgaum Walnut, Candle Nut tree.

CHAR. :—A handsome ornamental evergreen tree, 12-18 m. high, girth 1·5-1·8 m. Young shoots covered with a brownish stellate tomentum. *L.*—10-20 × 7·5-15 cm., collected at the ends of branches, ovate-lanceolate, acute or acuminate, often 3-5-lobed, and covered with a brownish or whitish tomentum when young and glabrous when old, cordate or obtuse at the base with 2 glands at the insertion of the petiole. *Fl.*—numerous, rather small, white on large terminal panicles; male flowers usually at the ends of the branches of the panicles; female flowers sessiled in the divisions of the panicles. Calyx both of male and female flowers pubescent or tomentose. Styles 2, 2-cleft. *Fr.*—drupe, 2·5-5 cm. diam, fleshy, a little compressed, olive-coloured, containing 2 or by abortion a single hard one-seeded nut. *Fl. t.*—Apr.-May. *Fr. t.*—rainy season; fruits ripen next cold season.

DISTR. :—Planted in gardens throughout the State: indigenous in the Malaya Archipelago.

GUMS & RESINS :—The gum often naturally exudes from the stem and is also found upon the fruit. The fruit gum is chewed by Tahitians.

*See* Oils, Dyes and Tans.

## ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cashew Apple or Nut; *G.* Kaju; *H.* Kaju; *K.* Gerubi, Godambe, Kampu; *M.* Kaju.

CHAR. :—A small evergreen tree with a short thick trunk, 7·5-9 m. high, girth ·6-·9 m. *Bark* thick, rough, grey coloured. *L.*—coriaceous, 10-15 × 3·8-7·5 cm., obovate or elliptic, rounded at the apex, shining above. *Fl.*—in terminal panicles with cymose branching, yellow with pink stripes. Corolla petals linear lanceolate, deflexed. *Fr.*—nut, reniform, 2·5 cm. long, dark-coloured on a pyriform yellow, orange in red coloured fleshy peduncle. *Fl. t.*—Jan.-Mar. *Fr. t.*—Mar.-Apr.

DISTR. :—Introduced from S. America. Naturalised throughout the State; very common near the seashore in open situations in Konkan and N. Kanara, especially in sandy places and often gregarious; along the coast forests of India and Ceylon; also cultivated.

GUMS & RESINS :—The bark of the plant yields a gum. The gum occurs in large stalactitic pieces. It is yellow or reddish and only slightly soluble in water. It is obnoxious to insects. The juice issuing from the incisions in the bark is used as an indelible marking ink. The astringent juice is used by native workmen as a flux for soldering metals.

*See* Medicinal Plants, Oils, Dyes and Tans, Fruit Trees.

## ANOGEISSUS LATIFOLIA Wall.

FAM.—Combretaceæ.

COM. NS. :—*E.* Button tree; *G.* Dabria, Damora, Dhavda; *H.* Bakla, Dhava, Dohu; *K.* Bejjalu, Dindala, Dindiga; *M.* Dhavda; *Tr.* Axle-wood.

CHAR. :—A large erect deciduous tree, 9-15 m. (sometimes 24 m.) high; girth 1·8-2·7 m. *Bark* smooth, light coloured, with shallow irregular depressions caused by exfoliations. Branchlets and young leaves with soft, silky or rusty pubescence. *L.*—5·13 cm. on petiole, coriaceous, ovate, or broad-elliptic, obtuse, retuse or emarginate. *Fl.*—heads in axillary racemes; peduncles one or more from the same axil, often branched. *Fr.*—very small, 2-winged, prickly, glabrous. Seeds solitary. *Fl. t.*—May.-July. *Fr. t.*—Nov.-Feb. Leafless during the whole of the cold season; new leaves in Apr.-May.

DISTR. :—Very common throughout the State usually in dry deciduous forests. Throughout the greater part of India; Ceylon.

GUMS & RESINS :—The tree yields what is known as *dhaura* gum. It is no less important than babul gum. It is inferior in strength to gum *arabic.* Under the name of *ghati-gum* it is largely sold in Bombay markets. As met with in the bazar the gum pieces are either round or vernicular, opaque externally and transparent internally and almost free from cracks. The colour varies from whitish yellow to amber. This gum is extensively used in sizing paper and in calico-printing. In India the reputation of this gum stands high with the Calico-printers. It is used medicinally and also eaten.

*See* Dyes and Tans, Medicinal Plants.

## ANTIARIS TOXICARIA Lesch.

FAM.—Urticaceæ.

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COM. NS. :—*E.* Upas tree; *H.* Chandkuda; *K.* Ajjanpatte, Bairi, Gajbugri; *M.* Chandala, Chandkuda, Karwat, Jasund.

CHAR. :—A very tall (gigantic) evergreen tree, buttressed at the base, 30·75 m. high; girth enormous sometimes reaching 9 m. *Bark* dark coloured, hard, smooth, *L.*—10-20 × 5-5·6 cm., petiolate, elliptic-oblong, accuminate, rounded or cordate at the base, entire, scabrous. *Male fl.*—axillary, crowded on a thick, flat receptacle; calyx lobes 4; stamens 3-8. *Female fl.*—solitary, enclosed in an involucre or imbricate bracts. Styles 2. *Fr.*—1·8 × 1·3 cm., 1 seeded red, velvety. *Fl. t.*—Sept.-Oct. *Fr. t.*—cold season.

DISTR. :—In the evergreen forests of the Konkan and N. Kanara, common near Yellapur; Western Peninsula; Burma (Pegu, Tennaserim), Ceylon, Malaya Peninsula.

GUMS & RESINS :—On cutting the stem or unripe fruits a white resin exudes in large quantities, which shortly hardens becoming of a black shining colour. This is used for poisoning arrows in Java and Malaya.

*See* Fibres.

## ARTOCARPUS INTEGRA (Thunb.) Merril.

## (ARTOCARPUS INTEGRIFOLIA Linn.)

FAM.—Moraceæ.

COM. NS. :—*E.* Jack-fruit Tree, Jack or Orange Wood; *G.* Vanas; *H.* Chakki, Kanthal, Ranos; *K.* Halasu, Kujja, Panesa, Tage; *M.* Phanas; *Tr.* Jack.

CHAR. :—A large evergreen tree, 12-18 m. high; girth 1·3-3 m. (sometimes more). Glabrous except the youngest parts. *Bark* thick, blackish, deeply cleft when old. *L.*—10-20 cm. long, coriaceous elliptic, entire (in young plants sometimes lobed), dark-green and shining above rough beneath, stipules large. *Fl.*—monoecious; densely crowded on globose one-sexual solitary, axillary receptacles; male receptacle cylindric without bracteoles; female attaining enormous size, 30-75 cm., tubercled; hanging on short stalks from the trunk; anthocarps, pyramidal. Seeds oblong or reniform, starchy, size of a nutmeg. *Fl. t.*—Nov.-Jan. *Fr. t.*—ripe June-Aug.

DISTR. :—Rain forests of Western Ghats, Konkan, often planted along roadsides in N. Kanara; planted near villages in the State; grown in gardens also; widely cultivated.

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GUMS & RESINS :—The bark and the fruit exude a milky latex containing 82-86 % of resin. The latex is not of any value as a source of rubber but the resin may be useful as a varnishing material. The bark yields a very dark looking gum with a resinous fracture, soluble in water. It is very elastic, leathery and water resisting.

*See* Medicinal Plants, Fibres, Dyes and Tans, Fruit Trees.

## ARTOCARPUS HIRSUTA Lamk.

FAM.—Moraceæ.

COM. NS. :—*E.* Anjeli-wood tree; *K.* Hebalsu, Habhalasu, Hebbalsina, Hesswa, Hessain; *M.* Pat-or Ran-Phanas; *Tr.* Aini.

CHAR. :—A very lofty evergreen tree attaining height of 60 m. (Brandis), with a trunk of great girth. *Bark* dark-coloured, scaly, young shoots, pedicels and peduncles hirsute with long tawny hairs. *L.*—broadly elliptic or ovate, coriaceous, entire. *F.*—on the axillary pedunculate receptacles; *male* receptacle narrowly cylindric, 10-15 cm. long, at first erect, afterwards pendulous; *female* ones erect, 11·3 × 8 cm. *Fr.*—size of a lemon, echinate; spines cylindric, straight, hispid. Seeds ovoid. *Fl. t.*—Jan.-Feb. *Fr. t.*—ripe in May.

DISTR. :—In the evergreen forests of the Konkan and N. Kanara. Deccan-Bhor country. Western Peninsula on the ghats from the Konkan southwards ascending to 1,200 m.

GUMS & RESINS :—The milky latex contains about 87-91 % of resin.

*See* Fruit Trees (w.), Oils.

## AZADIRACHTA INDICA Juss.

FAM.—Meliaceæ.

COM. NS. :—*E.* Neem or Margosa tree; *G.* Limbada, Limbra; *H.* Nim, Nimla; *K.* Bevu, Nimba; *M.* Balant-Nimb, Kadulimb.

CHAR. :—A moderate-sized to large tree, 12-15 m. sometimes 24 m. high, girth 1·8-2·7 m. *Bark* grey, with numerous scattered tubercels. *L.*—imparipinnate, approximated near the ends of the branches, 20·8-39 cm. long. Leaflets 9·15, 2·6-7·8 × 1·34-4 cm., opposite, sub-opposite or alternate, ovate-lanceolate, unequal-sided, oblique or sub-falcate, acuminate, serrate, glabrous, very shortly petiolued. *Fl.*—small, white, honey-scented on short puberulous pedicels arranged in large, solitary, axillary panicles shorter than the leaves. Calyx lobes 5, minute, rounded. Petals 5, shortly ciliate. Staminal tube as long as the petals. Anthers 10 opposite the teeth of staminal tube. Ovary 3-celled. *Fr.*—drupe, oblong, size almost of an olive, yellowish-green, stone always 1-celled, 1-seeded. *Fl.*—March-May. *Fr. t.*—rainy-season. Sheds leaves-hot season; new leaves — Mar.-Apr.

DISTR. :—A common tree growing throughout the greater part of India in the dry region; usually planted along roadside; also self-sown. In dry forests of the Karnatak and parts of the Deccan; Dry land forests of Burma.

GUMS & RESINS :—The bark exudes a clean bright, amber coloured gum, which is collected in small tears and fragments. It is said to form a portion of the commercial gum gattis and of East India gum; used medicinally.

*See* Medicinal Plants, Oils.

## BALSAMODENDRON MUKUL Hook F.

FAM.—Burseraceæ.

COM. NS. :—*E.* Gum gugul; *G.* Guggul Kukul; *H.* Gugul; *K.* Guggula; *M.* Guggula; *Sk.* Devdhup; Guggula, Jatala, Uddipta.

DISTR. :—Hills in Sind; Rajastan, Baluchistan, Arabia.

GUMS & RESINS :—The tree yields the gum-resin known as *Gugul* or as an *Indian Bedallium.* It occurs in vermicular or stalactitic pieces, is of a brown or dull-green colour and has a bitter aromatic taste and balsamic odour. It exudes from incisions in the bark made in cold season. It swells when heated diffusing a disagreeable odour. It is largely used as incense and also as a fixative in perfumery and in medicine.

*See* Medicinal Plants.

## BARLERIA PRIONITES Linn.

FAM.—Acanthaceæ.

COM. NS. :—*G.* Kanthashelio; *H.* Katoeriya, Vajradanti; *K.* Gorante, Mullu-goranta, Mudarangi; *M.* Kalsunda, Pivalikoranti; *Sk.* Bona, Jhinti, Kantakuranta, Kurantaka, Souriyaka.

CHAR. :—A shrub, 0·6-1·5 m. high, usually prickly, stems and branches 4-gonous; L.—9-18 × 2·5-5·7 cm. elliptic, acuminate, bristle-tipped, entire, usually with 3 acicular spines in the axils; *Fl.*—sessile, solitary in lower axils becoming spicte above; bracts foliaceous, bristle-tipped; bracteoles almost spinous; *C.*—yellow, infundibuliform, 2-lipped, upper tip 4-lobed, lower entire. *Fr.*—capsule, ovoid with a long tapering beak. 2-seeded. *Sd.*—clothed with silky hairs. *Fl. t.*—Oct.-Jan.

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DISTR. :—Throughout India, Sind, Ceylon, tropical Asia, tropical and S. Africa.

GUMS & RESINS :—One of the dark red-brown or black gums (Mr. Baden Powell).

The gum alluded to above is most probably a preparation from the juice; when fresh it is yellow but afterwards turns black (Dymock).

### BAUHINIA PURPUREA Linn.

FAM.—Caesalpinaceæ.

COM. NS. :—*H*. Kandan, Kaniar, Khaiswal, Sona; *K*. Sarul, Kanchivala; *M*. Devakanchan, Raktakanchan.

CHAR. :—A moderate-sized, evergreen usually bushy tree, 6-9 m. high, branches stout, glabrescent. *Bark* ash-coloured to dark-brown. *L*.—10-12·5 cm. broad, roundish, about as long as broad, divided 1/3-1/2 the way down into 2 obtuse lobes, glabrous above, faintly hairy beneath, base cordate, petioles 2·5-4 cm. long. *Fl*.—fragrant, in terminal and axillary few-flowered corymbose racemes, buds fusiform, pubescent. Calyx pubescent, tube slightly dilated upwards; limb about 2·2 cm., splitting into 2 segments slightly divided at the apex into 3 short teeth. Corolla petals 4·5 × 1·3 cm., oblanceolate, acute with a long claw, white, rose or purple. Fertile stamens 3 to 4; filaments as long as the petals. *Fr*.—pod, 15-30 × 2 cm., sub-woody, flat, pointed at both ends; seeds 12-16, oblong-ellipsoid, compressed, brown. *Fl. t*.—Sept.-Nov. *Fr. t*.—Jan.-Apr.

DISTR. :—Cultivated throughout the State in gardens. Wild in dry forests of the Deccan and Konkan (Talbot and Woodrow). Sub-Himalayan tract from the Ravi eastwards extending to 1,500 m., Southern India, Madhya Bharat, Bengal: Burma.

GUMS & RESINS :—The tree yields a gum called *sem-ki-gond*.

*See* Dyes & Tans, Fodder Plants, Fibres.

### BAUHINIA RACEMOSA Lam.

FAM.—Caesalpiniaceæ.

COM. NS. :—*H*. Ashta, Dhorara, Gurial, Kachnal, Makkuna; *K*. Apta, Banne; *M*. Apta, Seyara.

CHAR. :—A small deciduous tree, 6-9 m. high; girth ·9-1·2 m. *Bark* blackish, very rough, with deep vertical cracks. Branches drooping. L.—cordate at the base, deeply cleft, broader than long, with rusty or grey tomentum on the under surface. *Fl*.—whitish-yellow, in short-peduncled lax racemes, terminal or leaf-opposed 7·5-15 cm. long; pedicels shorter than calyx. Calyx tube turbinate. Corolla petals oblanceolate. Stamens 10, all fertile. *Fr.*—pod, 12·5-30 cm. × 2·5 cm. thick, falcate, 12-20 seeded. *Fl. t.*—Mar.-June. *Fr.*—Nov.-Mar. Sheds leaves Dec.-Jan.; new leaves Mar.-June.

DISTR. :—Common throughout India in deciduous forests. Ghats and hilly parts of Konkan, Deccan (Poona Dist.), Burma, Ceylon, China.

GUMS & RESINS :—The tree yields a gum used medicinally in South India.

*See* Fibres, Scared Plants, Fodder Plants.

## BAUHINIA VAHLII W. & A.

FAM.—Caesalpiniaceæ.

COM. NS. :—*H.* Maljan; *M.* Chambul.

CHAR. :—A gigantic climber with large leaves, divided not far down but deeply cordate. *Fl.*—large, white. *Pods* very long, thin, rusty hairy.

DISTR. :—Common in some parts of Konkan and ghats.

GUMS & RESINS :—It yields a copious gum which seems to be of very little use.

*See* Dyes & Tans, Fodder Plants.

सत्यमेव जयते

## BAUHINIA VARIEGATA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*G.* Kovidar; *H.* Kachnar, Kaniar, Pedrian; *K.* Arisiganlinga, Kangivala, Utipe; *M.* Kanchan.

CHAR. :—A medium-sized deciduous tree, young shoots brown and pubescent. *Bark* grey with vertical cracks. *L.*—10-15 cm. long and as broad, cleft 1/4 to 1/3 into two obtuse lobes, base deeply cordate. *Fl.*—in racemes, large, fragrant, white or purplish. Corolla petals 5, 6·3 cm. long, clavate with broad claws all white or 4 purple and fifth darker. *Fr.*—pod, 15-20 × 1·8-2·5 cm., flat, dehiscent. Seeds 10-15. *Fl. t.*—Feb.-Apr. *Fr. t.*—Nov.

DISTR. :—Cultivated throughout the State, often as a road-side tree; not indigenous; sub-Himalayan tract and outer Himalayas of the Punjab from the Indus eastwards, Kumaon, Sikkim. Burma, China.

GUMS & RESINS :—The tree yields a brown coloured gum similar to cherry-gum known as *Sem* or *Semla gond.* It swells in water, a very small-proportion only being soluble.

*See* Medicinal Plants, Dyes & Tans, Fodder Plants.

### BORASSUS FLABELLIFER Linn.

FAM.—Palmaceæ.

COM. NS. :—*E.* Brab tree, Fan-Desert or Palmyra-Palm ; *G.* Tad ; *H.* Tad ; *K.* Karilale, Ola, Talimara ; *M.* Tad.

CHAR. :—A large dioecious erect palm, 12-18 or even upto 30 m. in height, girth 1·5-1·8 mm. at the base ; swollen above the middle and again contracted upwards ; when young covered with dry leaves, when old marked with semi-circular scars of fallen leaves. *L.*—fan-shaped, ·9-1·5 m. across. ·4-·8 m. long, shining, folding along the midrib and united to half their length, and bifid at the apex ; petiole ·4-·8 m. long with spiny borders. Spathes several, incomplete. *Fl.*—pink and yellow. Male flowers in drooping stout, cylindrical catkins, arising in pairs of threes from the branches of the spadix ; calyx and corolla 3-cleft ; stamens 6, inserted in the corolla tube, no rudiment of ovary. Female flowers larger, greenish in paniculate spikes ; calyx and corolla 8 or 12 segments, closely imbricate, all similar in colour ; sterile stamens 6. *Fr.*—globose or obovoid, dark-brown, with a tinge of yellow, shining, 15 cm. in diameter or more. *Fl. t.*—Mar.-Apr. *Fr. t.*—May. The tree is said to live over 150 years.

DISTR. :—Coastal districts, cultivated. Very common in the coast districts of Ratnagiri, Kolaba and Thana. Planted and self-sown throughout the plains of India, Uttar Pradesh, South India. Burma, Ceylon, Indian Archipelago. Native of Tropical Africa.

GUMS & RESINS :—The palm yields a gum, which is black in colour and has a shining fracture.

*See* Medicinal Plants Fibres, Fruit Trees (w.), Sugar, Liquors.

### BOSWELLIA SERRATA Roxb.

FAM. :—Burseraceæ.

COM. NS. :—*E.* Incense tree ; *H.* Salar, Salga, Salhe ; *K.* Dhupa, Chitta, Maddi ; *M.* Salai, Salphali ; *Tr.* Salai.

CHAR. :—A moderate-sized deciduous tree, about 9 m. high and girth of about 1·5-1·8 m. *Bark* 1·34 cm. thick, yellow or greenish-yellow, exfoliating in small hard irregular flakes or thin plates. *L.*-alternate, 20·8-30 cm., imparipinnate near the ends of branches. Leaflets 17-31. 6-7 lin., opposite or nearly opposite, lanceolate-oblong, or ovate-lanceolate, rounded or obtuse at the apex, oblique at the base, coarsely serrate, sometimes entire, sessile or sub-sessile, sparingly pubescent specially when young. *Fl.*—white about ·07 cm. diam., in axillary or terminal racemes, shorter than leaves. Calyx segments 5-7. Corolla petals broad-ovate, narrowed at the base into a claw. Disc red crenate. Stamens about 10, inserted at the base of the disc. Anthers hairy. Ovary 3-celled; stigma 3-lobed. *Fr.*—capsule, 1·34 cm. long, trigonous, separating septicidally into 3 valves. *Fl.* t.-Feb.-June. Sheds leaves Mar.-Apr.; new foliage in June.

DISTR. :—Very abundant on the Satpudas, also in Khandesh forests. Common in the Deccan dry hills, Poona; and Belgaum; forests at the foot of the Himalayas as far west as the Sutlej; Madhya Bharat from Rajasthan to Bihar.

GUMS & RESINS :—The tree on tapping exudes an oleo-gum-resin which is known as Indian olibanum. This contains a volatile oil-resin similar to colophony and gum. The gum-resin called *Salai-gugul* occurs as a transparent, golden-yellow, semifluid substance, having slightly aromatic taste and balsamic resinous odour. It burns readily and diffuses an agreeable odour. It is probably one of the gums which formerly passed as frankincense in Europe, but its present uses are mostly restricted to India, where it is burnt as an incense in religious ceremonies and used in making up ointments, more especially for rheumatism.

The gum oleo-resin was investigated in detail in 1912 and on analysis gave 8% of good turpentine, 55% of good quality resin and 22% white soluble gum suitable for sizing and as a thickening agent in cloth printing. In view of these results on chemical side there was every possibility of a profitable industry developing in this product. This aspect was thoroughly investigated by the Forest Research Institute in 1927. Resin is found suitable for preparing varnishes.

Although there are extensive areas under this tree and oleo-gum-resin yields products which are likely to be readily utilised in industries, so far its commercial exploitation has not been possible for lack of economic method of tapping and collecting.

*See* Medicinal Plants, Fodder Plants.

## BUCHANANIA LANZAN Spreng.

FAM. :—Anacardiaceæ.

COM. NS. :—*G.* Charoli; *H.* Char, Paira, Piyal; *K.* Charpoppu, Kolegaru, Murukali; *M.* Char, Charoli, Pyalchar.

CHAR. :—A moderate-sized deciduous tree; trunk straight, 12-14 m. high, girth 1·2 m. *Bark* 2·5 cm. thick, dark-grey, sometimes nearly black, rough, tessellated with regular " boss "-like prominences.

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*L.*-15·25 × 6·3-12·5 cm., rounded or obtuse at the tip, coriaceous firm, entire, 15·20 pairs of prominent nerves, villous or pubescent, glabrate beneath, on a flattened, stout, pubescent petiole. *Fl.*—numerous, greenish-white, small, sessite or on very short pedicels, forming terminal and axillary, woolly or velvety, much-branched panicles, Calyx small, 5-toothed. Corolla petals oblong. Disc fleshy, 10-lobed. Stamens 10. Ovary only 1 fertile, conical, hairy; the remaining 4 reduced, to staminodes. *Fr.*-drupe, compressed, smooth, subglobose, black when ripe, 1·3 cm. long, Nut hard, bony, 2-valved. *Fl. t.*-Jan.-Mar. *Fr. t.*-Apr.-May. Sheds leaves in hot season.

DISTR. :—In dry and open forests throughout India, Konkan, Deccan, Dangs; Gujarat, S.M. Country, Burma, Cambodia, Indo-China, Siam.

GUMS & RESINS :—A pellucid gum exudes from wounds in the stem. It is, more than half, soluble in water and is reported to resemble *Bassora* gum. It occurs in irregular broken fragments. It is brittle, pale horn-coloured tinged with brown, tasteless. It is inferior to gum arabic and is used in dressing textiles also used medicinally.

Bark and the fruit furnish material for a varnish.

*See* Medicinal Plants, Oils, Dyes and Tans, Fodder Plants, Fruit Trees (W.).

### BUTEA MONOSPERMA (Lam.) O. Kuntz.

**(Butea frondosa Roxb.)**

FAM. :—Papilionaceæ.

COM. NS. :—*E.* Bastard Teak, Bengal Kino Tree, Flame of the Forest; *G.* Khakda, Khakaro; *H.* Chinchra, Dhak, Kakria; *K.* Muttala, Kuttugga; *M.* Palas, Paras.

CHAR. :—A moderate-sized deciduous tree; 12-15 m. high, girth 1·8-3 m. *Bark* fibrous, grey, exfoliating in small irregular pieces; exuding from cuts and fissure a red juice, which hardens into gum. Young parts covered with grey or brown silky pubescence. *L.*-pinnately-trifoliolate, in petiole 7·5-15 cm. long. Leaflets 10-15 × 7·5-11·7 cm., coriaceous, hard, glab-rescent above, hoary beneath; two lateral ones oblique-ovate; the terminal one roundish, obtuse, often emarginate at the apex, rhomboid at the base, larger, as long as broad in the middle. *Fl.*—large, bright orange-red, on thickly brown pubescent pedicels, arranged in tomentose, terminal and axillary racemes 15 cm. long. Calyx 1·3 cm., silky inside. Corolla-petals equal, densely clothed on external side with silky pubescence; standard broad; keel-acute, incurved. *Fr.*-legume, pendulous, tomentose, 6-8 × 4-5·5; Seed oval, flat, brown. *Fl. t.*-Feb.-Mar. *Ft. t.*-June-July. Sheds leaves in cold season; new leaves in Apr.

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Gums and Resins.

DISTR. :—Throughout the State, common in deciduous forests of Konkan, Deccan, Khandesh; throughout India from the Himalayas to Ceylon and Burma, usually in open grassy savannahs where it is often gregarious.

GUMS & RESINS :—It yields naturally or from artificial scars on the bark a gum which is sold as *Bengal Kino.* It occurs in the form of round tears as large as pea. It is of an intense ruby colour after fragmenting and has astringent taste; but it is usually very impure owing to careless collection. It is purified by solution in water. It is translucent but with age it darkens and becomes opaque; it is brittle. It is used in tanning and in medicine. It resembles true *gum kino.*

*See* Medicinal Plants, Oils, Dyes and Tans, Fibres, Fodder Plants, Sacred Plants.

## CALOPHYLLUM INOPHYLLUM Linn.

FAM. :—Guttiferfæ.

COM. NS. :—*E.* Alexandrian Laurel; *G.* Udi; *H.* Sultana-champi; *K.* Wuma, Hona, Pinekai; *M.* Undi; *Tr.* Poon.

CHAR. :—A beautiful evergreen tree; stem short with a thick cylindrical trunk; 15-18 m. high with a girth of about 1·8-4·2 cm., *Bark* dark coloured, scaly, fissured. *L.*-10·4-20·8 × 7·8-8·13 cm., elliptic or obovate-oblong, obtuse or retuse at the apex, usually acute at the base, firmly coriaceous, glabrous, shining; on a rather strong petiole. *Fl.*—about 2·6 cm. in diam., pure white, fragrant, arranged in axillary, glabrous, lax, few-flowered racemes, the length of the leaves or somewhat shorter. Calyx-sepals 4, the two inner petaloid. Corolla-petals 4, rarely 6-8. Stamens numerous, in 4 bundles. Ovary round, stipitate; style much longer than the stamens; stigma peltate. *Fr.*—an indehiscent drupe, 2·6 cm. diam., globular, yellow when ripe, pulpy. *Fl. t.*-hot season.

DISTR. :—Very common in Malabar and the sandy shores of the S. Konkan and N. Kanara associated with littoral species. Indigenous throughout the W. Peninsula, Orissa, Burma, Ceylon and the Andamans, particularly near the sea-coast, also cultivated as an ornamental tree.

GUMS & RESINS :—Incisions in the tree yield a yellowish-green translucent gum. It is soft and entirely soluble in rectified spirit and has a basant odour. It is not collected nor any use is made of it. It appears to have been used medicinally in old times.

*See* Medicinal Plants, Oils.

## CALOPHYLLUM TOMENTOSUM Wright.

FAM. :—Guttiferæ.

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COM. NS. :—*E.* Poon Spar tree, Sirpoon tree ; *K.* Surhonne, Ponne, Kve ; *M.* Nagari ; *Tr.* Poon.

CHAR. :—A large tall evergreen tree. Trees 45 m. high with a girth of 4·5 m. are common. Bark yellowish with long wavy, vertical fissures, branches 4-gonous, young shoots and panicles rusty-tomentose. *L.*-7·8-13 × 3·2-5·2 cm., elliptic or linear-lanceolate, with a bluntish acumination, rigidly coriaceous, shining, glabrous. *Fl.*-white, about 1·34 cm. diam., on slender pedicles, or racemes from the axils of upper leaves, sometimes arranged into a large terminal many-flowered panicle. Calyx-sepals 4, subrotund. Corolla-petals 4, ovate. Ovary 1-celled, 1-ovuled ; stigma peltate. *Fr.*.-drupe, ovoid, pointed, about 2·5 cm. long. *Fl. t.*-Jan.-Feb. *Fr. t.*-end of rainy season.

GUMS & RESINS :—The tree yields a black opaque gum. It is feebly astringent and soluble in cold water. The solution is brownish-yellow exhibiting a strong blue florescense.

*See* Oils.

## CALOPHYLLUM WEIGHTANUM Wall.

FAM. :—Guttiferæ.

COM. NS. :—*E.* Poon Spar of Travancore ; *K.* Irai, Kirihonne, Kulponne ; *M.* Bobbi ; *Tr.* Poon.

CHAR. :—A middle-sized evergreen tree, branches terete, young shoots square, glabrous. *Bark* very thick and characteristic, yellow. *L.*-5·2-10·4 × 3·2-5·2 cm., cuneate-obovate or oblong-cuneate. obtuse or retuse at the apex, very rigidly coriaceous, shining on petiole 1/6 in *Fl.*-white, 67 cm. diam., on slender pedicels, with a canducous bract at their insertion, arranged in axillary, many-flowered racemes, shorter than the leaves. Calyx-sepals 4, thin, strongly veined. Corolla-petals usually none. Ovary 1-celled. *Fr.*-2 cm., oblong. *Fl. t.*-Dec.-*Fr. t.*-Mar.

DISTR. :—Moist forests of the Western Peninsula from the Konkan southwards. Common along the banks of North Kanara rivers ; Ceylon.

GUMS & RESINS :—The tree yields a gum in large, translucent, irregular lumps of yellowish colour ; it is of horny texture, somewhat brittle, without odour ; the taste is soapy and when placed in water gradually softens and finally disintegrates into a fine granular matter which floats in the form of flaky particles of dirty white colour and numerous oil-globules which gradually collect upon the substance. The water dissolves a small portion and becomes slightly viscid.

*See* Oils.

## CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

SECTION 5.
Gums and Resins.

COM. NS. :—*E.* Gigantic swallow-wort; *G.* Akdo, Dholaakdo; *H.* Ak, Ark, Madar; *K.* Arka, Ekke, Mandara; *M.* Akand, Madar, Rui; *Sk.* Arka, Mandara, 'Shuka-phala, Kshirparni, Kshiranga.

CHAR. :—A large shrub, 2·4-3 m. high, much branched, often gregarious, branches stout, covered with cottony pubescence; *L.*—opposite, 10-20 × 3·8-10 cm., sessile, elliptic or ovate oblong, thick, base cordate, sometimes amplexicaul, both surfaces tomentose. *Fl.*—in umbellate cymes, purplish or white, buds ovoid. *C.*—lobes deltoid-ovate, corona shorter than the column, back much curved; apex with two auricles. *Fr.*—follicles, 9-10 cm. long, broad, green. *Sd.*—many, comose. *Fl. t.*—Feb.- July.

DISTR. :—Throughout the State in dry waste places; very common, Himalayas ascending 1000 m.; very common in S. India, Ceylon, Malaya Islands and S. China.

GUMS & RESINS :—Gutta-percha—The inspissated and sun-dried milky sap from the stem constitutes the malar gutta of India. This substance has not been made much use of though it is said to be useful. Chemical tests made on this gutta indicate that it is a fairly good conductor of electricity, but is not suited for electrical purposes.

*See* Fibres, Dyes & Tans Sacred Plants, Fodder Plants.

## CALOTROPIS PROCERA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*H.* Ak, Madar, Safedak; *M.* Mandara; *Sk.* Ark, Mandara, Rajarka.

CHAR. :—An erect shrub usually 1·8-2·4 m. high; young parts white, cottony; bark corky, spongy; *L.*—subsessile, usually 5·7-15 × 4·5-8·2 cm., ovate oblong, elliptic or obovate; *Fl.*—purplish in umbellate cymes, buds globose; *C.*—about 2·5 cm. across, lobes usually erect, corona lobes equalling or exceeding the staminal column. *Fr.*—7·5-10 × 5·7 m., sub-globose, ellipsoid or ovoid. *Sd.*—broadly ovate, flattened tomentose, comose.

DISTR. :—More or less common in warm dry places throughout India, abundant in Sind, Afghanistan, Waziristan, Arabia, Egypt, Iran, Tropical Africa.

GUMS & RESINS :—Same as the preceding.

*See* Fibres.

## CANARIUM STRICTUM Roxb.

FAM.—Burseraceæ.

SECTION 5.

Gums and Resins.

COM. NS. :—*E.* Black Dammar Tree; *K.* Raldhup; *M.* Gugul.

CHAR. :—A very large deciduous straight tree. *Bark* grey, roughish young branches, petioles and panicles clothed with dense rusty-tomentum. *L.*—·3-1·2 m., equally or unequally pinnate. Leaflets 7-15; 7·8-31·2 × 5·2-13 cm., opposite or sub-opposite, ovate-oblong, or ovate-lanceolate, acuminate, petioled, more or less crenulate, glabrescent and shining above, more or less tomentose beneath. *Fl.*—white, numerous, in axillary panicles. Calyx-campanulate, tomentose, 3-4 fid., velvet, persistent. Corolla-petals 3-4, much imbricate, thinly hairy at the apex. Male flower-disc none. Stamens 6, filaments united below into a tube. Anthers oblong, dorsifixed, dehiscing longitudinally. Ovary small, 6-lobed, densely hairy-tomentose at the apex. Female flower-ovary glabrous, as long as the stout style. *Fr.*—drupe, oval, 4-5·2 cm., tapering at both ends, with a hard, bony, 3-celled nut. *Fl. t.*—hot season. *Fr. t.*—cold season (Jan.). This handsome tree is one of the most conspicuous trees in the forests, especially when in new leaf, for the young leaves are of a bright crimson colour, very hairy and like red velvet.

DISTR. :—In evergreen forests from the Konkan hills southwards in W. Peninsula. Common in some of the N. Kanara ghats; various parts of Madras State; alt., 1,500 m.

GUMS & RESINS :—The tree yields a resin known commercially as *black dammar* of S. India. Vertical incisions are made in the bark about 2 m. from the bottom. The resin is obtained by lighting a fire round the base of the tree, thereby damaging the bark and outer layers of the wood. This results in a flow of resin some two years later and the flow, which lasts for about six months every year, continues for about ten years. The resin is of a deep brown colour. It is chiefly used for the manufacture of varnish and bottling wax; also used as a substitute for Burgandy pitch for medical plasters. Locally it is used for caulking boats; a considerable quantity of coaltar pitch is imported into India and put to similar uses. The possibilities of utilizing *black dammar* as a substitute for the former may be worth investigating.

## CAREYA ARBOREA Roxb.

FAM.—Lecythidaceæ.

COM. NS. :—*E.* Wild Guava; *G.* Kumbi; *H.* Kumbhi, Vakambi; *K.* Daddala, Gavahannu, Hennumatti; *M.* Kumbha.

CHAR. :—A glabrous middle-sized or sometimes a large deciduous tree, 9-18 m. high; girth 1·5-2·4 m. *Bark* thick, rough, dark-grey; inner bark red, fibrous. Wholly glabrous. *L.*—15-30 × 10-15 cm., oblong, ovate or orbicular, membranous, sessile or very short-petioled, crenate, denticulate, obtuse or shortly acute. *Fl.*—5-6·5 cm. diam., white with purple filaments, subtended by 3 unequal tracts arranged in short spikes, with an unpleasant smell. Calyx campanulate. *Fr.*—6·5 × 5 cm., globose, and crowned with the persistent calyx-tube. *Fl. t.*—Mar.-Apr. *Fr. t.*—May-July. Sheds leaves during early part of hot season and is soon covered with new leaves (Mar.-Apr.). Leaves turn red in cold season.

DISTR. :—Very common throughout India and the State in monsoon forests; also in valleys and ravines throughout the drier areas. Common in S. Konkan and Western Ghats; Ceylon, Malayan Peninsula, Siam.

GUMS & RESINS :—It yields a brown or greenish-brown gum. This forms with water a tolerably thick mucilage of dark brown colour. It is not much used.

*See* Medicinal Plants, Fibres, Dyes & Tans, Fodder Plants, Fruit Trees (w.)

## CHLOROXYLON SWIETENIA Dc.

FAM.—Rutaceæ.

COM. NS. :—*E.* Satin Wood; *K.* Huragalu, Mashwal; *M.* Bheria, Billu, Halda.

CHAR. :—A moderate-sized deciduous tree. *Bark* soft, spongy, fissured, light grey or yellow. Young parts, petioles and inflorescence covered with minute grey pubscence. *L.*—abruptly pinnate, 13-23 cm. long. Leaflets 20-40, 1·7-4 × ·7-1·3 cm., opposite, sub-opposite or alternate, unequal-sided, oblong, obtuse at the apex, glabrous on both sides, pale and dotted on the under surface, shortly petiolulate. *Fl.*—white, small, on long villous pedicels, forming large, branched, terminal and axillary panicles. Calyx lobes 5, ovate, acute, Petals 5, free from the base, membranous. Stamens 10; filaments free, inserted in the sinsuses of the disc. Ovary 3-celled. *Fr.*—capsule, 2·6 × 1·3 cm., oblong, bark-brown, glabrous. *Fl. t.*—Mar.-Apr. *Fr. t.*—Apr.-Oct. New leaves appear in May.

DISTR. :—Common on the Satpuras and the drier parts of the Bombay State; abundant on the sandstone formation both in the Bijapur and Belgaum districts. Madhya Bharat and Southern India; Ceylon.

GUMS & RESINS :—It yields a gum known as *Satin-wood* gum. It is in irregular, fractured, and agglutinated tears, very variable in size; it is brittle, has a shining resinous fracture, translucent, brown, some what resembling babul-gum, soluble in water and slightly sweet. Not much use is made of this gum.

*See* Oils, Dyes & Tans.

## CEIBA PENTANDRA (Linn) Gaertm.

FAM. :—Bombacaceæ.

SECTION 5.
Gums and Resins.

COM. NS. :—*E.* The white silk cotton tree, Kapok tree, *H.* Hatian, Katan, Safed-Simal, Senibal; *K.* Dudi mara, Bili-lurga, Marali; *M.* Katesawar, Shamieula.

CHAR. :—A moderate-sized tree, growing to large size in Khandesh, 18-24 m. high, girth 3-3·6 m.. Trunk straight, armed when young with conical woody prickles; branches spreading horizontally; all parts glabrous. *L.*-5·8 foliolate, on petioles as long as or longer than the leaflets; leaflets 7·8-10·4 × 2·6 cm., lanceolate, acuminate or cuspidate with a mucro, entire or serrulate towards the point, glaucescent beneath, shortly petioluled or almost sessile. *Fl.*-appearing before the leaves, of a dingy white colour, on peduncles about 5·2 cm., fascicled, axillary or terminal, 1-flowered, drooping. Calyx thick, coriaceous, 5-lobed, lobes roundish, glabrous externally, downy within. Petals 5,2·6 cm., oblong, connate at the base, thick, tomentose outside. Staminal bundles 5, united at the base, each bearing 2-3 variously convolute, linear, 1-celled anthers. Ovary ovoid, 5-celled, thick; stigma entire or 5-lobed. *Fr.*-capsule oblong, thick, coriaceous, 5-valved. Seeds numerous, black, imbedded in a silky wool. *Fl. t.*-Feb.-Mar. *Fr. t.*-Apr.-May. Sheds leaves in cold season. Continues leafless till hot season.

DISTR. :—Wild in Khandesh; also in Gujarat, Poona, Konkan and N. Kanara; throughout hotter parts of India. Planted near villages and temples. Burma.

GUMS & RESINS :—The tree yields a gum of a dark-red colour and almost opaque. It is generally known as *Hatain-ka-kond.* It is classed as a pseudo-gum. It is insoluble in water but swells and forms a pasty mass. It is astringent; used medicinally.

*See* Fibres, Oils, Dyes & Tans, Famine Plants, Fruit Trees(w) Fodder Plants.

## COCHLOSPERMUM RELIGIOSUM (L) Alst.

FAM. :—Cochlospermaceæ.

COM. NS. :—*H.* Kumbi, Gabdi, Galgal; *K.* Kad. burroga; *M.* Ganglay, Galgal, Ganeri.

CHAR. :—A small deciduous tree, with short thick spreading branches, 6-9 m. high, with a girth ·6-·9 m. *Bark* 2·6 cm. thick, fibrous, deeply furrowed; inner substance red. Branchlets, young leaves, and peduncles grey-tomentose. *L.*-7·8-20.8 cm. diam., palmately 3-5-lobed, old glabrous, lobes accute or acuminate, entire;

petioles long, thick, stipules linear, caducous. *Fl.*-10·4-13 cm. diam, bright yellow, on terminal panicles. Sepals oblong, concave, silky. Petals obcordate, obliquely emarginate or irregularly cleft. *Fr.*-capsule, 5·2-7·8 cm., 5-lobed, size of a goose-egg. Seeds numerous, covered with long cottony hairs. *Fl. t.*-Feb.-Apr. *Fr. t.*-June-July. Sheds its leaves in Jan.; new leaves appearing in May.

DISTR. :—Deccan, Gujarat, common in the Khandesh Satpudas on the trap; also in the Belgaum district on Kaladgi quartzite; forests at the base of the Western Himalayas, from the Sutlej eastwards, Madhya Bharat, Burma. Cultivated in Ceylon near temples.

GUMS & RESINS :—The gum is obtained freely, on the trees being tapped. It exudes from the fibrous bark. It is often sold in the bazars of India as a *Katira,* the name having been given to this gum by early Mahomedan settlers in India. It occures in striated and twisted pieces of a pale semi-transparent colour, transversely fissured with a tendency to split up into flat scales; While not soluble, it readily becomes diffused in minute particles through a large quantity of water; hence its applicability to the art of marbling paper for which it is used. It is used as a substitute for gum tragacanth in calico-printing. It is largely used by Indian shoe-makers for dressing leather; used for giving polish to tassar silk; also used in ice-cream industry in Europe.

*See* Fibres, Oils, Fodder Plants.

## CORDIA ROTHII Roem & Schult.

FAM.—Boraginaceæ.

COM. NS. :—*H.* Gund, Gundi, Gundni, *K.* Kadchellai, Kiriseli, Narvalli; *M.* Gondani.

CHAR. :—A small or moderate-sized deciduous tree, 6·12 m. high; girth ·9-1·5 m. *Bark* grey with deep longitudinal fissures. *L.*—7·5-10 × 2·5-4 cm., oblanceolate, obtuse, sub-opposite, entire, mucronate, rough, tapering to a petiole, 1·3 cm. *Fl.*-small, white, numerous, 4-5-cleft, on terminal and axillary pedunculate cymes. Corolla-lobes 4-5 reflexed. Stamens 4-5. *Fr.*—drup, size of a pea, orange-yellow, longitudinally striated. *Fl. t.*-Apr.-June. *Fr. t.*-cold season.

DISTR. :—Through the dry districts of the State; often planted and self-sown along the bunds of tanks and near villages; dry zones of North-West and Southern India, Madhya Bharat; plentiful in Rajasthan.

GUMS & RESINS :—The bark when wounded yields a gum. This is said to be eaten by poorer classes in Baroda State.

## CRATAEVA NURVULA Ham.

FAM.—Capperidaceæ.

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Gums and Resins.

COM. NS. :—*H.* Barna, Biliana, Bilasi; *K.* Bitusi, Narave, Nirvala, Hole Lakki; *M.* Kumla, Karwan, Hadwurna, Waiwurna.

CHAR. :—A moderate-sized deciduous tree, 9-12 m. high with a girth of ·9-1·8 m. *Bark* grey, 1·34 cm. thick, with long horizontal wrinkles. Glabrous with lenticles on branches. *L.*-trifoliolate, long-petioled, clustered towards the ends of branches; leaflets ovate-lanceolate or obovate-lanceolate, abruptly or gradually acuminate, on articulate petioles, pale or glaucous beneath. *Fl.*-5·2-7·8 diam., white, becoming greenish-yellow, at length purplish, on long filiform pedicels, in many-flowered terminal corymbs. Sepals 4, ovate, inserted with the petals on the broad-lobed hemispherical disc. Petals 4, ovate or oblong, obtuse or acute, long clawed. *Fr.*-2·6-5·2 cm. diam., ovate or globose, on a thick gynophore, many-seeded. *Fl. t.*-hot season Mar.-Apr. Young leaves appear in the same season. *Fr. t.*-rainy season.

DISTR. :—Throughout India from the Punjab southwards, chiefly in low-lying shady places, often near banks of streams; found all over the Konkan, Malabar, Kanara, Madras Assam, Ceylon, Burma; often planted near temples and Muslim tombs. Tonkin, China, Formosa, Malaya Archipelago, Polynesia and tropical Africa.

GUMS & RESINS :—The fruit is mixed with morter to form a strong cement (Stewart.)

*See* Medicinal Plants.

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## DIOSPYROS EMBRYOPTERIS Pers.

FAM. :—Ebenaceæ.

COM. NS. :—*E.* Riber Ebony, Wild Mangosteen; *G.* Zeeberwo; *H.* Gale, Kala-tendu, Makurkendi, Tendu; *K.* Banda, Gavandu, Tumari, Tumaki-mara; *M.* Temburni, Timbwini; *Tr.* Ebony.

CHAR. :—A small evergeen tree, branches forming a dense shady head, 9-10·5 m. high, girth about 1·2 m. *Bark* smooth, dark-grey, almost black, with a greenish tinge, Leaf bud silky with adpressed hairs. *L.*-13-20 × 5 cm., alternate, short-petioled, coriaceous, smooth, shining, linear-oblong on thick wrinkled petioles. *Fl.*-white, fragrant, tetramerous; male peduncles axillary, length of petiole drooping, 3-6 flowered, furnished with a small deciduous bract, anthers 40 on 20 filaments; female axillary, solitary, larger than the male, on sort recurved pedicel. Staminodes 1-4. Ovary globular, hairy, 8-12-celled. Styles 4-6. Stigma branched, usually 2-3 fid. *Fr.*-4·5 cm.

diam., globular, rusty-yellow when ripe, covered with a rusty, meal-like tomentun. Seeds usually 5-8, immersed in vicid glutinous pulp, reniform. *Fl. t.*-Mar-May. *Fr. t.*-cold season.

DISTR. :—Near creeks and back-waters, along the coast of N. Kanara, and the Konkan; in the rain forests and river-beds in the ghats. Throughout India from the Himalayas to Ceylon. Common in Bengal, Siam, Malaya Archipelago.

GUMS & RESINS :—The fruits yield a resinous gummy substance. It is used in caulking small boats and for colouring fishing nets to protect them from wear and tear.

*See* Medicinal Plants.

## DIPTEROCARPUS TURBINATUS Gaertn.

FAM. :—Dipterocarpaceæ.

COM. NS. :—*E.* Wood oil Tree, .*G.* Gurjan., .*K.* Challans, ·*M.* Challon.

CHAR. :—A tall tree; trunk straight; bark deeply cracked. *L.* Large ovate, entire or crenate, glabrous, shinning above, *Fl.* large, in axilary 3-8 flowered racemes, white tinged with red. *Fr.* small, subglobose, hairy.

DISTR. :—Sparingly in the Southern forests in the State; Southern ghats of N. Kanara; Eastern coast; Eastern Bengal, Pegu, Singapore, Andamans.

GUMS & RESINS :—It yields an important oleo-resin called Gurjan oil. It is obtained by tapping the trunk of the tree; a pear-shaped cut is made in the trunk nearly one meter above ground. The cut is often ·6 m. long and ·45 m. wide and slopes into the tree at the base to form a receptacle to catch the exudation. The fire is lit periodically inside if the flow is sluggish. The oil then collects at the bottom of the hollow which is emptied every three or four days. In the Andamans it is collected from January till May and the flow is always greatest in the hot season. Gurjan oil is exported to Europe and is used there in the manufacture of varnishes and as an ingredient in lithographic ink. In Burma it is said to protect woodwork from insect attack and for this purpose it is largely used for smearing on wood-work and wicker-work, in caulking and varnishing boats and mixed up with rotton wood; it is made up into torches; it is also used medicinally.

*See* Oils.

## ELAEODENDRON GLAUCUM Per.

FAM. :—Celastraceæ.

COM. NS. :—*G.* Alan ; *H.* Bakra, Debri ; *K.* Mulkariki ; *M.* Aran, Burkas. Tamruj.

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CHAR. :—A small tree, grows sometimes to a great height 9-15 m., with a girth of ·9-2·4 m. *Bark* usually thick, thin in large trees, grey or dark-coloured, exfoliating in four-sided very small scales. *L.*-5-15·5 × 2-6·5, opposite, elliptic-ovate or oblong, acute or acuminate, crenate or nearly entire, membranous or coriaceous, glaucous when young. *Fl.*-small, pentamerous, yellowish or greenish-white on axillary, diffuse, dischotomous cymes, about half the length of the leaves; peduncles longer than the petioles. *Fr.*-drupe, hard woody, ovoid or obvoid, 1·3 cm. long, 1-celled, 1-seeded. *Fl. t.*—Feb.-June. *Fr. t.*-ripe in May.

DISTAR. :—Throughout the Bombay State in deciduous forests. On the ghats of N. Kanara and Belgaum in evergreen forests, attains considerable dimensions; common in the Goond forests of N. Kanara. Outer Himalayas up to 1,800 m., Oudh, Madhya Pradesh and the W. Peninsula; Ceylon, Malayan Archipelago.

GUMS & RESINS :—It is supposed to yield a gum which occurs in roundish tears, rough or cracked on the surface. It is tasteless and forms a sherry-coloured solution with water.

*See* Poisonous Plants and Fish Poisons; Fodder Plants.

## ERYTHRINA VARIEGATA (Var. Orientalis)

## (ERYTHRINA INDICA Lam.)

FAM. :—Papilionaceæ.

COM. NS. :—*E.* Indian coral tree, Mochi-wood; *G.* Bangara, Panarvo, Panderoo; *H.* Dadap, Pangara, Pangira; *K.* Halivan, Hongara, Mullumuriga, Salaki; *M.* Pangara.

CHAR. :—A tall deciduous tree, armed with black prickles; petioles and leaves unarmed. *Bark* yellowish, smooth and shining, peeling off in thin papery flakes. *L.*—pinnately trifoliate, on petioles 10-15 cm. long. Leaflets broad-ovate, entire, short, acuminate, somewhat cordate at the base, membranous, glabrous; terminal leaflet 10-15 cm. long and broad, largest round, cuspidate, truncate, or broad rhomboidal at the base. *Fl.*—bright scarlet, large, on pubescent pedicels, arranged in axillary or terminal racemes, 15 cm. long. Calyx 2·5-4 cm. long, spathaceous, with a very oblique mouth, 5-toothed at the top; standard 5-8·3 cm. long, the blade 2·5 cm. broad; wings and keel nearly equal. *Fr.*—legume, 15-30 cm. long, cuspidate, distinctly torulose, blackish; 1-8 oblong, red or purple seeds. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-July. Sheds leaves in cold season; new leaves in Mar.-Apr.

DISTR. :—In the deciduous forests of the Konkan and N. Kanara, Indigenous along sea-coast. Planted as support for pepper-vines, and for grape-vines in the Nasik district. Throughout India from

Himalayas southwards, coast forests of Malabar; Burma, Pegu, Andamans and Nicobar, Planted for ornament.

GUMS & RESINS :—It yields a dark-brown gum of little importance.

*See* Medicinal Plants, Fibres, Dyes & Tans.

## EUPHORBIA NERIFOLIA

FAM.—Euphorbiaceæ

COM. NS. :—*G.* Thor; *K.* Yellikalli; *M.* Nivdung, Kantesabar.

CHAR. :—A large glabrous fleshy crect deciduous shrub or small tree, reaching 6 m. or more high; branches round, somewhat verticillate, with pairs of sharp stipular spines, arising from low, conical truncate, distant, spirally arranged tubercles. *Bark* reticulated. *L.*—towards the end of the branches, fleshy, alternate, 10-20 × 3·1-6·3 obovate, rounded at the apex, tapering towards the base. *Fl.*—involucres hemispheric, 3-nate, forming small solitary or twin cymes from above the leaf-scars; the central flower of each cyme male, sessile, the two lateral 2-sexual, pedicellate. *Fr.*—capsule, ·6 cm. broad. Seeds smooth. *Fl. t.*—and *Fr. t.*—Feb.-Mar. Sheds leaves Oct.-Dec.; new leaves at the beginning of rainy season.

DISTR. :—Dry rocky hills. Gujarat-common; often planted in hedges. N. W. Himalayas. Western Peninsula; Sind, Burma, Pegu.

GUMS & RESINS :—It yields a gum or gutta – percha like substance on boiling.

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## EUPHORBIA TIRUCALLI Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Indian Tree Spurge, Milk-bush; *G.* Dandalio thor, Paradeshi thor; *H.* Sahud, Sondh, Shirthahar; *K.* Bottu-galli, Koduor Mondu-kalli; *M.* Nangya sher, Nevali sher.

CHAR. :—A small tree about 6 m. high; girth ·3-·6 m. *Bark* brown or greenish-brown. Branches spreading, cylindric, rush-like, smooth, green, almost leafless. *L.*—small, linear, 6-13 mm. long, appearing in rainy season. *Fl.*—involucers clustered in the forks of branchlets, mostly female, campanulate. *Fr.*—capsule, coccivelvety. Seeds ovoid, smooth. *Fl. t.*—Aug.-Sept.

DISTR. :—Naturalised throughout the dry districts of India and the State; cultivated as hedge plant all over; Native of E. Africa, Ceylon.

GUMS & RESINS :—Plant gives milky juice. It hardens after boiling and becomes brittle; while warm it is as ductile as gutta-percha. Very difficult to deal with as it causes excruciating pains when it comes in contact with cut skin or eyes. It is used criminally.

*See* Medicinal Plants, Dyes & Tans, Poisonous Plants, Fish Poisons.

### EXAECARIA AGALLOCHA Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* The blinding tree; *K.* Hars; *M.* Geva, Phungli, Surund.

CHAR. :—A small poisonous evergreen tree with white highly acrid juice, 4·5-7·6 m. high; girth ·6-1·5 m. *Bark* grey, smooth, shining, with numerous round prominent lenticels. *L.*—alternate, thickly coriaceous, 5-10 × 3·8-5 cm., elliptic, acuminate, entire or shallowly sinuate-crenate, base acute. *Fl.*—minute, fragrant, yellowish-green, bracts fleshy; male flowers sessile in catkins-like spikes; female flowers pedicellate. Inflorescence raceme, the upper flowers usually imperfect. *Fr.*—capsules, very variable in size, ·6-2·5 cm. in diameter. Seeds subglobose, smooth. *Fl. t.*—July-Aug. *Fr. t.*—Sept.-Oct.

DISTR. :—In tidal marshes along the coast of the State, very common in the Konkan and N. Kanara. Tidal forests on the sea-coast of India: Ceylon, Tropical Asia, Indian Archipelago, N. Australia.

GUMS & RESINS :—The wood contains a Poisonous sap which hardens into a black caoutchouc like substance.

### FERONIA ELEPHANTUM Corr.

FAM.—Rutaceæ.

COM. NS. :—*E.* Elephant or Wood apple; *G.* Kavit, Kotha; *H.* Bilin, Kait, Kat-bel; *K.* Beloda, Byala, Malura, Manmadha; *M.* Kavath, Kavit.

CHAR. :—A deciduous tree, armed with strong, straight axillary thorns, 6-9 m. high and ·6-1·2 m. girth. *Bark* grey or nearly black, very rough, thick, wrinkled, with longitudinal shallow furrows. *L.*—5·2-10·4 cm., alternate, imparipinnate, quite glabrous, shining. Petiole slightly winged or not. Leaflets 5-7, about 3·1 cm. long, opposite, lanceolate, cuneate or obovate, obtuse, entire or crenate towards the apex, membranous, almost sessile. *Fl.*—polygamous by abortion, dull red, on slender pedicels, in terminal or axillary, lax panicles. Calyx small, 5-toothed, deciduous. Petals 5, sometimes 4-6 spreading, imbricate, Stamens 10-12, inserted around a short disc. Filaments dilated at the base. Anthers linear-oblong. Ovary in the male flower small, abortive; stigma 5-lobed. Ovary in the female flower, oblong. 5-6 celled, or at length 1-celled. Style none; stigma large, 5-lobed, deciduous. *Fr.*—berry large, 6·3 cm. diam. or larger globose, woody, hard, grey-coloured, rough, 1-celled, many-seeded. Seeds numerous, imbedded in a fleshy edible pulp. *Fl. t.*—Feb.-Apr. *Fr. t.*—rainy season; sheds leaves during hot season.

DISTR.:—Common in Konkan and Deccan, throughout India in dry situations. Often cultivated; indigenous in S. India, Java, Ceylon, Burma.

GUMS & RESINS:—The tree yields a gum which occurs in the form of irregular, semi-transparent, reddish-brown tears. Treated with water it affords a brownish, tasteless mucilage, not less adhesive than that of gum arabic for which it may be used as a substitute; used medicinally.

*See* Medicinal Plants, Oils, Fruit Trees, Fodder Plants, Sacred Plants.

## FICUS ELASTICA Roxb.

FAM.—Urticaceæ.

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COM. NS.:—*E.* Indian Caoutchouc or Rubber Tree; *M.* Rabar-ache Zad.

CHAR.:—A gigantic tree, perfectly glabrous, sending down many aerial roots from the branches; trunk supported by high branching buttresses. *Bark* reddish-brown, smooth but scurfy; in open spaces it is sometimes grey. *L.*—shining, elliptic, abruptly and shortly acuminate, 12·5-25 × 1·3-63 cm., parallel nerved, stipules pink upto 15 cm. long. *Receptacles* enclosed, while young by hooded involucres, which fall off leaving a saucer-shaped base under the fruit, sessile, greenish-yellow when ripe, ovoid-oblong, 1·3 cm. long.

DISTR.:—Grown as an ornamental tree in garden in Bombay and Poona; also in Belgaum fort. A native of the Outer Himalayas, Assam, Khasia Hills; Burma Malayan Archipelago.

GUMS & RESINS:—The tree yields the caoutchouc of Indian commerce. The aerial roots as well as the stems are tapped. The tree may take 12-15 years to attain a tappable size when it yields large quantities of rubber, which is collected as a scrap and formed into large balls. This is the earliest source of rubber known and was originally used for erasers.

## FICUS RACEMOSA Linn.
## (FICUS GLOMERATA Roxb).

FAM.—Moraceæ.

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COM. NS. :—*E.* Gular-or Country Fig; *G.* Umar, Umro, Umbro; *H.* Demer, Gular, Lalka, Umar; *K.* Atti, Rumadi; *M.* Umbar.

CHAR. :—An evergreen tree, 15-18 m. high; girth 1·5-2·4 m. sometimes more in favourable circumstances. *Bark* thick, brownish-grey, rather smooth, scaly glabrous. *L.*—7·5-15 × 3·2-6·3 cm. alternate, ovate-oblong to lanceolate, entire, acute, smooth on both sides, pale beneath and covered with minute green dots. *Receptacles* large, *size* and shape of a common pear, purplish when ripe, arising, in short paniculate clusters from the trunk and larger branches. *Fr. t.*—usually Mar.-July.

DISTR. :—Common throughout the State near villages along roadside, and along the streams and rivers; common in Western ghats and Konkan, Deccan Peninsula. Salt Range and Rajasthan to the Khasia mountains : Burma, Ceylon.

GUMS & RESINS :—The tree yields milky juice — Caoutchouc — from which bird-lime is prepared.

*See* Medicinal Plants, Sacred Plants.

## FICUS RELIGIOSA Linn.

FAM.—Urticaceæ.

COM. NS. :—*E.* Peepal Tree; *G.* Jari, Pipra, Pipal; *H.* Pipal, Pipli; *K.* Arani, Ashwathamara, Pippala, Ragi; *M.* Pimpal.

CHAR. :—A large evergreen, usually epiphytic tree but without aerial roots, 24-27 m. high; girth 7·5-9 m. *Bark* grey, nearly 1·3 cm. thick, exfoliating in rounded irregular flakes of varying size, often leaving rounded depressions. *L.*—coriaceous, 10-18 × 7·5-10 cm., ovate, rotund, narrowed upwards and the apex produced into a linear-lanceolate tail, entire; base broad, rounded, truncate, shining. *Receptacles* in pairs, axillary, sessile, depressed, globose, 13 mm. in diameter, male flowers, few, only near the mouth of the receptacle, gall and fertile female flowers sessile or pedicelled. *Fr. t.*—ripe May-July (sometimes towards the end of rainy season).

DISTR. :—Planted near temples and in villages throughout the State. Wild in the sub-Himalayan tract, Bengal and Madhya Bharat. Planted all over.

GUMS & RESINS :—The bark yields a tenaceous milky juice which hardens into a substance resembling caoutchocu. The bird-lime is prepared from this milky juice, which is, in the Deccan called *Shelim.*

*See* Medicinal Plants, Fibres, Sacred Plants.

## FLACOURTIA RAMONTCHI L'Herit. Var. Sapida Roxb.

FAM.—Flacourtiaceæ.

COM. NS. :—*G.* Kankod; *H.* Bilangra, Kanju, Kattar; *K.* Gajal, Mullettari, Hannumanth; *M.* Bhekal, Kakas, Paker, Tambat.

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CHAR. :—A small thorny deciduous tree, 6-7·5 m. high with a short trunk of 1·2-1·5 m. in girth; armed with acute axillary spines 2·6-5·2 cm. Bark grey, thin. L.—5·2-9·14 × 3·25-5·87 cm., ovate-oblong, ovate or suborbicular, serrate or crenate, glabrous and shining above. *Fl.*—greenish-yellow, in short racemes or panicles; dioecious. Styles 5-11, very short, united at the base, radiate. *Fr.*—a drupe, dark-red or black, pulpu, roundish, about 1-34 cm. long, seeds 8-16, flat, compressed. *Fl. t.*—Nov.-Mar. *Fr. t.*—May-June. Sheds its leaves Jan.-Feb.; new leaves Apr.-May. Three varieties of this species are found within the limits of the Bombay State.

DISTR. :—Common in the ghat jungles from Bombay southwards. North Kanara and S. M. Country jungles; ascends to 1,110 m. in the Khandesh Satpuras; common near the lakes at Toranmal (Akrani Mahal); Sub-Himalayan tract from the Punjab eastwards, Rajasthan, Bihar, Madhya Bharat, and the Peninsula; mostly in dry open places and rocky hills, Burma, Ceylon.

GUMS & RESINS :—The tree yields a gum which is used medicinally.

*See* Medicinal Plants.

## GARCINIA CAMBOGIA Desr.

FAM.—Guttiferæ.

COM. NS. :—*K.* Dharambe, Upagimara, Manthulli; *M.* Vilaiti amli.

CHAR. :—An evergreen middle-size tree. Grows to a considerable size in favourable places. *Bark* ·67 cm. thick, grey, smooth, lenticillate, containing abundance of bright yellow gamboge. *L.*—5·2-15·6 × 1·34-3·96 cm., oblong, elliptic or lanceolate, acuminate, attenuated at the end, coriaceous, dark-green, shining above. *Fl.*—polygamous; yellow, 2 cm. diam., hermaphrodite larger, terminal or axillary, solitary or in fascicles, sessile or pedicelled. *Male fl.*—thickened towards the tip. Sepals with narrow membranous margins, outer sepals smaller. Petals twice as long as sepals, concave. Anthers numerous (12-20 or more), adnate to a short androphore; cells dehiscing longitudinally, introse. *Female fl.*—staminodia surrounding the base of the ovary in several phalanges, each consisting of 2-3 sterile stamens. Ovary 6-10-celled; stigma

6-10, free nearly to the base. *Fr.*—succulent, 6·54-7·8 cm. diam., ovate or oblong-vooid, yellow or reddish, 6-10 furrowed; furrows with angular edges ending about the middle; the apex is flat, depressed, or nipple-shaped. Seeds 6-8, with pulpy aril. *Fl. t.*—Feb.-Mar. *Fr. t.*— June-July.

DISTR. :—Evergreen forests of the Western ghats from Kanara sourthwards, abundant in N. Kanara, Madras; both the Peninsulas; Eastern Himalayas, Eastern Bengal; Burma, Penang and the Andaman Islands. Also cultivated in gardens.

GUMS & RESINS :—It yields a yellow, insoluble and very adhesive gum.

*See* Oils.

### GARCINIA MORELIA Desr.

FAM.—Guttiferæ.

COM. NS. :—*E.* The Gamboge Tree; *K.* Arsian-gurgi, Hardala.

CHAR. :—A middling sized tree with spreading branches; young branches quadrangular. *L.*—elliptic-obovate, narrowed at the base. Male flowers axillary in fascicles of 2·5; stamens many combined to form a central column. Female flowers axillary, solitary. *Fr.*—small, subglobose.

DISTR. :—Kanara-evergreen forests; Eastern Bengal, Khasia hills. Western Peninsula.

GUMS & RESINS :—The tree produces the true gamboge. It consists of a mixture of resin and gum. The method of obtaining gamboge is usually by cutting gashes in the bark, the gummy tatex being allowed to coagulate in the cuts and then stripped off. It generally occurs in the form of tears or grains. Gamboge is used in artists paints, in dyes and also in medicine. The chief trade supply is obtained from Siam and an attempt appears to have been made to collect the exudation free from impurities for commercial purposes though the Siam and Indian gambose are quite identical. The gum is not collected to any extent in the Indian forests.

*See* Dyes and Tans.

### GARCINIA XANTHOCHYMUS Hook f.

FAM.—Guttiferæ.

COM. NS. :—*H.* Dampel; *K.* Divarige, eavaki, Janagi; *M.* Jharambi.

CHAR. :—A medium sized beautiful evergreen tree 12-15 m. high, with girth of ·9-1·5 m. *Bark* brown, inner bark white, ·67 m. thick, without yellow glands, exfoliating in small round scales.

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**Gums and Resins.**

Glabrous, trunk straight, branches drooping, sharply angled and often enlarged immediately below the axils of leaves. *L.*—23-47 × 5-10 cm., oblong-lanceolate, acute or shortly acuminate at the apex, more or less attenuated at the base, hardly coriaceous, shining green, glabrous; petiole enlarged near the insertion on the stem. *Fl.*—white, with a very slight tinge of yellow. *Male and hermaphrodite fl.*—2 cm. diam., in 4-8-flowered fascicles, from the axils of fallen leaves; sepals small, usually 5, orbicular, concave, unequal. Petals usually 5, larger, spreading. Stamens united in 5-phalanges of 3-5, alternating with 5-glands; no ovary. *Female fl.*—solitary in the axils of fallen leaves; ovary ovoid, 5-6-celled, crowned with a large 5-6-lobed stigma. Fruit the size of an apple, subglobose or oval, yellow. Seeds 1-4,; oblong. *Fl. t.*—hot season. *Fr. t.*—rainy season upto Jan.

DISTR. :—On the Bombay ghats; abundant in the evergreen forests of N. Kanara; Madras ghats. All over both the Peninsulas. Eastern Himalayas, Eastern Bengal. Burma, Penang and the Andaman islands. Also cultivated in gardens.

GUMS & RESINS :—The tree yields a large quantity of inferior gambage both from the stem and the fruit-rind. From the full grown fruit a quantity of creamy, resinous, yellow, gum like gambose is obtained which makes a tolerably fair water-colour.

*See* Dyes and Tans.

## GARDENIA GUMMIFERA Linn.

FAM.—Rubiaceæ.

COM. NS. :—Same as Gardenia *resinifera* Roth.

CHAR. :—A large, glabrous, unarmed shrub or a small deciduous tree, about 2 m. high. *Bark* greenish-brown, smooth buds resinous. *L.*—4-7·5 cm., with 15-20 pairs of nerves, sessile, or sub-sessile, obovate-oblong, acute or obtuse, with cordate base, coriaceous, shining, occassionally puberulous beneath. Stipules sheating, truncate or mucronate. *Fl.*—sub-sessile, white, fragrant, terminal, 1-3-together. Corolla tube 4-5 cm., glabrous or pubescent; limb 4·5-7·5 cm. diam., divisions 5, narrow, oblong, obtuse. *Fr.*—oblong, 2·5-4 cm., small, crowned with the persistent calyx; pericarp thin, crustaceous; endocarp 4-5 valved. *Fl. t.*—Feb.-June. *Fr. t.*—during the rains. Leafless during hot season.

DISTR. :—Open situations; Western Peninsula from the Satpuda range southwards. Common on lalerite in S. M. Country and N. Kanara; Northern ghats of Madras State. Ceylon.

GUMS & RESINS :—The remarkable gum-resin *Dikemali* is obtained from this species. The exudation forms transparent tears from the extremities of the young shoots and buds. These shoots and buds

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are broken off with the drops of gum-resin attached and exposed for sale either in this form or after agglutination into cakes or irregular masses. This is used medicinally.

*See* Medicinal Plants.

### GARUGA PINNATA Roxb.

FAM.—Bursecaceæ.

COM. NS. :—*H.* Ghogar, Kaikar; *K.* Aranelli, Balagi, Khandergai, Nellagodda, Sodikonne; *M.* Kakad, Kangkar, Kudak, Kurak.

CHAR. :—A large deciduous tree; trunk strong, erect, 15-18 m. high, girth about 1·5-1·8 m. *Bark.* 2·6 cm. thick, soft, red inside, gray or brown outside, exfoliating in large irregularly shaped flakes. *L.* about 31 cm. long or more, alternate, imparipinnate, near ends of branches. Leaflets 13-19, 5·2-10·4 × 2·6-3·2 cm., nearly opposite, lanceolate or ovate-lanceolate, acuminate at the apex, unequal at the base, subessile, crenate, glabrous or tomentose. *Fl.*—yellowish-white, in large compound pubescent panicles; bracts deciduous. Calyx teeth 5, ovate, pubescent. Petals 5, linear, inserted at the throat of the calyx, between its teeth. Stamens 10, filaments, ovary and style hairy; anthers versatile. *Fr.*—drupe, fleshy, smooth, size of a gooseberry, containing 1-5 one-seeded nuts. *Fl. t.*—Feb.—May. *Fr. t.*—rainy season. Sheds leaves in cold season; new foliage early in hot season.

DISTR. :—Common in the Konkan and the Deccan hills; throughout the dry forests of India from the Jumna to Burma and southwards to the Nilgiris; Andamans and Cocos Islands.

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GUMS & RESINS. :—The tree yields a greenish-yellow, translucent exudation in small mamilliform massas, having a mild turpentine-like odour and taste. It has been generally regarded by Indian writers as a true gum.

Watson and Cooke classify it with gum acacia. Dymock states that it contains small proportions of areoleo-resin and in reality a gum-resin.

*See* Dyes and Tans.

### HARWICKIA BINATA Roxb.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*H.* Anjan; *K.* Kamra, Karachi; *M.* Anjan; *Tr.* Anjan.

CHAR. :—A deciduous tree; tap-root upto 2·4 m. long, trunk straight, 15-18 m. high, occasionally 30-36 m. *Bark* thick, dark-grey, rough with irregular vertical cracks, exfoliating in narrow flakes, *L.*—abruptly pinnate, leaflets 2, sessile, oblique, ovate trapezoid, entire, obtuse, 2·5-7·5 cm. long with 4-5-veins radiating from the base. Stipules small, caducous. *Fl.*—greenish-yellow, on long terminal and axillary panicled racemes. Pedicels as long as the calyx. Sepals oblong obtuse, petals O. Stamens 10. Ovary oblong, sessile; stigma capitate. *Fr.*—pod, thin, dry, lanceolate,, 5-7 cm. long, dry, with 1 seed at the top *Fl. t.*—cold season. *Fr. t.*—Apr. May.

DISTR. :—In the dry forests of the State; a gregarious tree but very local, common on the trap of the Satpudas in Khandesh, also in the Belgaum district. There is a small forest of this in Ranebennur taluka of Dharwar. Nemad in Madhya Bharat, Southern India, Benaras, Chanda, Banda dist. of U. P.: Tropical Africa.

GUMS & RESINS :—It yields a gum (Gamble). It appears probable that the so called gum may really be a form of balsamic oleo-resin, resembling that obtained from the other species.

*See* Fibres.

## HOLIGARNA ARNOTTIANA Hook F.

FAM.—Anacardiaceæ.

COM. NS. :—*K.* Hoolgeri, Kagira, Kootigheri; *M.* Sudrabilo.

CHAR. :—A large evergreen tree, 9-15 m. high, girth ·9-1·5 m. *Bark* ash-coloured, smooth. Young shoots pubescent. *L.*—15·5-24 × 5·8 cm., about the ends of branches, more or less spathulate or cuneate-ovate or oblong, obtuse or acute, gradually narrowed down to the petiole, entire coriaceous, shining above, glaucous or not beneath; nerves 16-20 pairs, strong conspicuous on both surfaces; petiole glabrous or rufo-pubescent, with 2 tubercles on the top. furnished about the middle with two subulate, spur-like, deciduous processes. Panicles of compound racemes axillary and terminal, densely rufo-tomentose; male and female on different trees. *Fl.*—numerous, dull-white, minute; male flowers smaller than the female. Calyx 5-thoothed. Petals 5, villous, cohering at their sides with the margin of the disc. Stamens 5, inserted round the top, about 2·5 cm. long. *Fl. t.*—Jan-Feb. *Fr. t.*—June-July.

DISTR. :—Common in the evergreen forests of the Konkan and N. Kanara, southwards in the Western Peninsula, Coorg.

GUMS & RESINS :—A very acrid black juice is obtained from the trunk and fruit rind which is used by painters and as a black varnish.

### LARGERSTROEMIA PRAVIFLORA Roxb.

FAM.—Lythraceæ.

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COM. NS. :—*G.* Kakria ; *H.* Adhauri, Bakli, Katdhaura, Lendya, Senia ; *K.* Chununge, Ventaku ; *M.* Bondara,, Lendi, Nandi, Sokutia ; *Tr.* Lendi.

CHAR. :—A large deciduous tree, 15-21 m. high ; girth 1·8-2·4 m. *Bark* light brown, thin, exfoliating in long, thin, woody scales. Glabrous, branchlets and young leaves are pubescent at least on midrib. *L.*—5·9 cm., oblong, opposite, coriaceous, sessile or shortly-petiolate, rounded at the base, acute or acuminate-obtuse, glaucous beneath. *Fl.*—white, fragrant on slender pedicels, forming lax axillary or terminal panciles. *Calyx* glabrous or minutely-downy, not ribbed ; lobes 6-7, ultimately erect, adpressed to the fruit. Petals clawed crumpled. The 6 outer stamens much longer than the inner ones. *Fr.*—capsule, oblong or obovate-oblong, 1·3-2·5 cm. long, 3-4-celled. Seeds with a terminal wing. *Fl. t.*—Apr.-June. *Fr. t.*—rainy season. Sheds leaves Mar.-Apr.; new leaves—May. The tree often produces burrs especially when injured. Large trees are often hollow in the centre.

DISTR. :—Throughout the State in deciduous forests from the coast in land ; Konkan, Deccan hills ; S. M. Country (Belgaum). base of the W. Himalayas, W. Peninsula.

GUMS & RESINS :—A gum exudes from the bark and is said to be sweet and edible.

*See* Fibres, Dyes and Tans.

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### LANNEA GRANDIS Engl.

FAM.—Anacardiaceæ.

COM. NS. :—*H.* Ginyan, Kimul Mogena ; *K.* Gojal, Punil, Shimti ; *M.* Moi, Moja, Shimbat, Shimti.

CHAR. :—A moderate-sized or large deciduous tree, 12-15 m. high, girth 1·5-2·4 m. *Bark* 1·3 cm. thick, gray, compact, smooth, exfoliating in small irregular plates, inner bark red, mucilaginous. Young parts and inflorescence covered with stellate tomentum. *L.*—31-47 cm., unequally pinnate near the ends of branches. Lealflets 7-9, 5-15 × 1·3 cm., oblong-ovate, caudate-acuminate, entire, membranous, glabrous, sub-sessile, the terminal one long petioluate. Racemes slender ; male compound, long ; female simple and short. *Fl.*—tetramerous, purplish or greenish-yellow, on short pedicles. Bracts ciliate. Sepals obtuse, ciliate. Petals twice as long, oblong, coriaceous, spreading. Stamens 7, in male flowers as long as the petals. Ovary, sessile 1-celled. *Fr.*—drupe, kidney-shaped, red or purple when ripe, size of a pea. *Fl. t.*—Feb.-Mar. *Fr. t.*—hot season. Remains leafless from Feb.-June. On the east side of the Peninsula in leaf almost throughout the whole year; ugly when leafless but handsome in full foliage.

DISTR. :—Common throughout the State in deciduous forests. Throughout the hotter parts of India. Lower Himalayas and the sub-Himalayan forests, Assam, Bengal, Madras, Madhya Pradesh, South India; Burma, Ceylon and Andamans. Very commonly planted.

GUMS & RESINS :—The tree gives *Jhingon* gum of commerce. It exudes from the cuts made into the bark with an axe. Tapping generally starts in March and continues till the onset of rains. It exudes partly in round tear-drops and partly in fragments. The flow is first yellowish-white in colour, which later takes a brownish tinge and becomes blackish afterwards. The tapping is done for five years by which time the flow lessens. The trees are given rest for healing their wounds and for regaining vitality. The gum has a disagreeable taste. It is much used along with *dhavda* gum in calico-printing and in Nepal as a paper-size. It is employed as a basis of varnishes. It is used in India as a mucilage for making ink and in the fine parts of plaster-work. It is useful to confectioners owing to its great solubility in water; a certain amount is exported for this purpose.

*See* Dyes Tans.

## MACARAGA TOMENTOSA Wt.

FAM.—Euphorbiaceæ.

COM. NS. :—*K.* Chandkal, Upalkai, Upligi, Upranti; *M.* Chanda, Chandada, Chandori.

CHAR. :—A small or middle-sized tree, branchlets stout, young shoots tomentose. *Bark* dark-grey. L.—12·5-20 × 8-14 cm. ovate or deltoid —ovate or orbicular, cuspidate, broadly peltate, entire or minutely toothed, glabrous above, pubescent and closely gland-dotted beneath, base rounded. *Male fl.*—minute, numerous, in interrupted dense sessile heads, enveloped in bracts, arranged in numerous much-branched axillary, rusty tomentose panicles, sepals 3. *Female fl.*—panicles simpler than in the male; calyx-limb obsolete. *Fr.*—panicles simpler than in the male; calyx-limb obsolete. *Fr.*—capsule, ·6-·9 cm. in diameter, globose, hairy and grandular. Seed globose, brown, rough, *Fl. t.*—Jan.-Mar. *Fr. t.*—Apr.-May.

DISTR. :—Throughout the moist forests of the Konkan and N. Kanara, very common at Matheran, Khandala, Parghat, Thalghat, Western Peninsula; Hills of Orissa and Circars. Ceylon.

GUMS & RESINS :—A gummy substance exudes from the out branches and the base of the heaf-stalks. It is of a bright crimson colour and has been used for taking impressions of leaves, coins, medallions, etc. When the gum is carefully prepared the impressions are as sharp as sulphur without its brittleness. Powdered and made into paste it is reckoned a good external application for venereal diseases.

*See* Fruit Trees (w.).

### MADHUKA INDICA Gmel.

FAM.—Sapotaceæ.

COM. NS. :—*E.* Honey Tree, Mahuva of S. India; *G.* Mahuda, Movonujhad; *H.* Moha, Mohua; *K.* Ippe, Huli, Movaro; *M.* Moha-chejhad, Mohwa.

CHAR. :—A large evergreen tree, 12-15 m. high; girth 1·2-1·8 m. *Bark* dark-yellowish-grey, thick, slightly furrowed, scaly; inner bark red, milky. Young shoots villous. *L.*—10-10 × 2·5-4 cm., clustered near the ends of the branches, lanceolate, narrow at both ends, entire, smooth on villous petioles 2·5-4 cm. stipules villous, caducous, ensiform. *Fl.*—crowded near the ends of branches, pedicels 5-7·5 cm., sub-erect, one-flowered. Calyx segments 4, acute. Corolla tube equal to length of calyx, limb 8-10-cleft. Anthers 16-20 in two series. *Fr.*—berry, oblong, size of a plum, yellowish when ripe. *Fl. t.*—Apr.-May. *Fr. t.*—Aug.-Sept.

DISTR. :—Common in the dry forests and along the rivers and *nalas* in the State; common in the Konkan and N. Kannara but nowhere abundant. Western Peninsula, Mysore, Karnatak. Ceylon, upper Burma. Often planted.

GUMS & RESINS :—It yields a white milky gum from incisious and from cracks in the bark. The discharge of gum is facilitated by process of ringing the tree during the fruiting season. The gum does not seem to be of economic value.

*See* Medicinal Plants, Oils, Dyes & Tans, Fodder Plants, Famine Plants, Poisonous Plants, and Fish Poisons.

### MADHUKA LONGIFOLIA Mecbr.

FAM.—Sapotaceæ.

COM. NS. :—*E.* Butter Tree, Mahua Tree; *G.* Mahuda, Mahura; *H.* Mahua, Mahula, Mowa; *K.* Dodipa, Honnage Ippi, Pokka; *M.* Moha, Mhawra, Mowda.

CHAR. :—A large deciduous tree, 12-15 m. high girth 1·8-2·1 m. *Bark* 1·3 m. thick, grey with vertical cracks exfoliating in thin scales; inner bark red, milky. Young parts, petiole and pedicels pubescent or tawny-tomentose. *L.*—10-20 × 5-10 cm., elliptic or oblong elliptic, short-acuminate, coriaceous, congested near the ends of branches; petiole round 2·5-4 cm., stipules subulate, downy. *Fl.*—white, or yellowish-white, numerous, fleshy, crowded from the extremity of the branches, drooping on pedicels 2·5-4 cm. Calyx 4·5 sepalled, coriaceous, densely rusty-tomentose. Corolla-tube ovoid, limb of 7-14 parts, stamens 20-80 in three series. *Fr.*—fleshy, ovoid, 2·5-5 cm., 1-4 seeded, very rarely more. *Fl. t.*—Mar.-Apr. *Fr. t.*—June-July. Leafless Feb.-Apr.; new leaves appear soon after.

DISTR. :—Deciduous forests; prefer dry sandy and rocky soils; thrives on Deccan trap. Common in the deciduous forests throughout the State; also in Konkan and N. Kanara; often cultivated and self-sown near villages; forests of Madhya Pradesh, Western Bengal, Kumaon Tarai. Burma.

GUMS & RESINS :—It yields an inferior gum used medicinally in Madras.

There is frequently to be found a drop of whitish, soft, tasteless resin on the spices of flowers before they open (Roxburgh).

*See* Medicinal Plants, Oils, Famine Plants.

## MANGIFERA INDICA Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cuckoo's Joy, Mango tree; *G.* Ambo, Amri; *H.* Am.; *K.* Mavin-mara, Mavu, Rasala; *M.* Amba; *Tr.* Mango.

CHAR. :—A large evergreen tree 15-20 m. high, with girth upto 4-5 m. *Bark* thick, dark-grey, nearly black, rough, with numerous small fissures and exfoliating scales. *L.*—coriaceous, oblong-lanceolate 12·5-25 × 3·5-7·5 cm., shining above. *Fl.*—monoecious in terminal panicles, pubescent. Calyx 4-5 partite, deciduous. Petals, 4-5, oblong with 3 orange-coloured ridges on the inner face. Stamens 4-5, only one fertile. *Fr.*—drupe, large, fleshy, sub-ovoid, 7·5-20 cm. long, stone compressed hard. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-June.

DISTR. :—Common everywhere, wild and cultivated; rain forests of Konkan and N. Kanara ghats and the Satpudas; cultivated throughout the State; tropical Himalayas, Bhutan, Bihar, Khasia, Hills, Sikkim, Western Peninsula from Khandesh southwards; cultivated throughout India for its fruit. Burma.

GUMS & RESINS :—The bark yields a gum frequently sold in bazars as gum arabic.

*See* Medicinal Plants, Dyes & Tans, Fruit Trees, Sacred Plants, Fodder Plants.

## MESUA FERREA Linn.

FAM.—Guttiferæ.

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COM. NS. :—*E.* Assam or Ceylon Iron Wood; *H.* Naghas, Nagkesara; *K.* Kag Kesar, Nagsampige; *M.* Nag-champa; *Tr.* Mesua.

CHAR. :—A large evergreen glabrous tree, 15-18 m. high with a girth of about 1·8-2·1 m. Trunk straight, branches slender, obsoletely 4-angled. *Bark* ·67 cm. thick, reddish brown, peeling off in flat, thin flakes, having a slightly roughened surface. *L.*—very variable in size, usually 7·8-15·6 ×4-4·8 cm., linear-lanceolate or oblong-lanceolate, acute or acuminate at the apex, acute or rounded at the base, rigidly coriaceous, glabrous, dark-green and shining above, covered or less with fine white tomentum or glaucous beneath; veins very fine, numerous, close-set, inconspicuous. *Fl.*—large, 2-2·8 cm. in diam., pure white, fragrant (the fragrance partaking of rose and violet), usually terminal, and solitary or in pairs. Sepals 4, rotundate, fleshy, velvety with membranous margins, inner pair largest. Petals 4, spreading, broadly obovate. Stamens numerous, free or connate at the base. Anthers large, golden-yellow, 2-celled, dehiscing vertically. Ovary 2-celled. Style long, with a peltate stigma. Fr.—drupe, of a variable size often the size of a pigeon's egg, ovate, acuminate, striate, the base surrounded by the persistent sepals. Seeds 1, rarely 2-4, dark-brown, smooth. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-June. A very variable species as regards the size of the flowers, width of the leaves, and the amount of white mealy covering underneath and quality of wood.

DISTR. :—Throughout the evergreen rain-forests of N. Kannara and S. Kanara, S. Konkan, mountains of E. Bengal, E. Himalayas, E. and W. Peninsulas, and the Andamans; Ceylon; often cultivated on account of its flowers. Isolated trees are occasionally found in bloom in the tropical evergreen forests and covered with a mass of scented white and yellow flowers, looking like pyramids and surrounded by myriads of winged insects.

GUMS & RESINS :—A tenacious, glutinous celeo-resin, with a sharp aromatic odour, exudes round the base of the tender fruit. It has been recommended as a substitute for Canada Balsam. It may be obtained by taking incisious in the bark or root, and is said, when diluted with oil or turpentine to make a very good wood varnish.

*See* Medicinal Plants, Oils.

## MIMUSOPS ELENGI Linn.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Baphuli, Borasalli, Vareuli; *H.* Bakul, Bolsari, Mulsari; *K.* Bakul, Kalhale, Mugule, Manjale; *M.* Bakul, Vavali.

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CHAR. :–A large glabrous evergreen tree, 12-15 m. high girth 1·2-2·1 m., head compact, leafy; trunk erect. *Bark* grey, rough deeply cracked with vertical and transverse fissures; young shoots and pedicels shortly rusty-pubescent. *L.*–7·5-10 × 2·5-4 cm. entire, smooth, coriaceous, shining, glabrous, elliptic-oblong, acuminate, on a petiole 1·3-2 cm. *Fl.*–white, very fragrant, about 1·5 cm. diam., in axillary fascicles of 2-8, on drooping tawny pedicels 4·6 lin. Calyx segments 8. Corolla lobes three times as many as sepals; the outer series consists of 16 (occasionally 12), the inner of 8 (occasionally 6) lobes. Stamens 8. *Fr.*–berry, about 1·3-2·5 cm., yellow when ripe, smooth, edible, 1-seeded by abortion. *Fl. t.*–Jan.-Apr. *Fr. t.*–about the end of rains.

DISTR. :–Evergreen forests; common in the rain-forests of N. Kanara and the Konkan; often planted in gardens; Western Peninsula; Ceylon. Malaya; cultivated in the tropics.

GUMS & RESINS :–The tree yields the Pagoda gum of Madras.

*See* Medicinal Plants, Oils, Dyes & Tans, Fruit Trees.

## MORINGA OLEIFERA Lam.

FAM.–Moringaceæ.

COM. NS. :–*E.* Drum-stick tree, Indian horse-raddish; *G.* Sargavo, Seglo; *H.* Ganjna, Senjana, Senja; *K.* Kochka, Nuggi; *M.* Shevga, Shekat.

CHAR. :–A tree, 4·5-7·5 m. high, girth 1·2-1·5 m. *Bark* 2·5 cm., thick, grey, corky, with longitudinal cracks. Young parts tomentose. *L.*–·3-·6 m. long, alternate, twice or usually thrice pinnate; petiole sheathing at the base; pinnæ 4-6 pairs. Pinnules 6-9 pairs, opposite, elliptic, ovate, or obovate on slender petiolules; glands between each pair of pinnæ. *Fl.*–2·5 cm. diam., white, honey-scented, arranged in panicles spreading at the ends of branches. Sepals linear-lanceolate. Petals linear-spathulate. Fertile filaments hairy at the base. Ovary villous. *Fr.*–pod, 23-46 cm., pendulous, with 9 longitudinal ribs. Seeds 3-gonous, winged at the angles. *Fl. t.*–Jan.-Apr. *Fr. t.*–Apr. onwards. Sheds leaves Dec.-Jan. New leaves–Mar.-Apr.

DISTR.:–Wild in the sub-Himalayan tract from the Chenab to the Sarada; also in Cutch forests. Cultivated in fields and gardens all over the State, and throughout India; Burma and Ceylon.

GUMS & RESINS :–It yields a gum which is white when it exudes but gradually turns to mahogony colour on the surface forming a hard mass. It belongs to the tragacanth series; it is insoluble in water; it is one of those frequently called Mocharas, used in native medicine. It is also used in calico-printing.

*See* Medicinal Plants, Fibres, Oils, Vegetables.

## OUGEINIA DALBERGIOIDES Benth.

FAM.—Papilionaceæ.

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COM. NS. :—*H.* Sandan, Tinnas, Timsa; *K.* Betta honne, Kari mutal; *M.* Kala palas, Tiwas; *Tr.* Sandan.

CHAR. :—A moderate-sized deciduous tree, 6-12 m. high, girth ·9-2·1 m.; trunk short, erect. *Bark* light brown, sometimes with bluish patches, with regular longitudinal and horizontal cracks. Branches terete, slender. *L.*—about 31 cm. long, ternate, alternate, stipulate, petioled. Leaflets coriaceous, glabrous or pubescent below, wavy; terminal leaflet 7-5·15 × 5-7·5 cm., roundish or obovate; lateral, 10 × 7·5 cm. opposite, oblique-oval, obtuse, entire or crenate. *Fl.*—numerous, white or pale-rose, fragrant, on slender pedicels forming short, fascicled racemes. Calyx sub-bilabiate. *Fr.*—pod, 5-7·5 cm., linear-oblong, obtuse, contracted between the seeds, Seeds 2-5 *Fl. t.*—Mar.-May, *Fr. t.*—June.

DISTR. :—Throughout the State in deciduous forests; fairly common in the forests of Yellapur (N. Kanara), northern and central India, Lower Himalayas from the Jhelum to Bhutan up to 1,500 m.; Bihar, Chota Nagpur, Orissa, and the Circars down to the Godavari; Occasional in Mysore and the Nilgiris.

GUMS & RESINS. :—It yields an astringent red gum very similar to Dragon's blood.

*See* Fibres, Fodder Plants, Poisonous Plants & Fish Poisons.

## PITHECOLOBIUM SAMAN Benth.

FAM.—Mimosaceæ.

COM. NAMES :—*E.* Rain-tree; *M.* Saman.

CHAR. :—A large, spreading, quick growing tree. *L.*—2-pinnate, *Fl.*—in globose heads. *Fr.*—Pod straight, rather flat. indehiscent, with a sweet pulp around the seeds.

DISTR.:—Cultivated as a roadside tree in the State. Native of Central and Tropical S. America.

GUMS & RESINS :—It yields a clear yellow gum, which is of very inferior quality. It occurs in irregular tears or vernicular pieces with waved transverse ridges. It is soft and tough; swells up in water into tough mass and on keeping turns a reddish brown or black colour.

## PITTOSPORUM FLORIBUNDUM W. & A.

FAM.—Pittostoraceæ.

COM. NS. :—*H.* Raini ; *K.* Tammata ; *M.* Yekadi, Vekhari, Vikhari.

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CHAR. :—A small tree ; branches often umbelled. *Bark* very thin, light greenish-grey with very prominent horizontal lenticels. Trunk short. *L.*—5·2-20·3 ×2·6-7·8 cm., elliptic or oblong-lanceolate, acute or acuminate, margins waved, thinly-coriaceous, glabrous, shining above, pale below ; *Fl.*—numerous, dingy-yellow, small, pubescent, terminal much-branched compact racemes or corymbs. Sepals obtuse or acute. Petals oblong, obtuse, patent, at last recurved. *Fr.*—capsule, glabrous, rugose, about 6-seeded, opening into 2, hard broad-ovate valves. *Fl. t.*—Jan.-June. *Fr. t.*—Apr.-Sept.

DISTR. :—Mahabaleshwar and all along the Western Ghats upto Nilgiris. Pretty common at Khandala, mostly on dry and rocky sides ; sub-Himalayan tract and lower Himalayas from the Jumna to Sikkim along rivers and in ravines, Khasia and Mishmi hills. Hills of S. Arcot and Salem ; Burma.

GUMS & RESINS :—The plant yields an aromatic yellow resin or ole-resin having very tenacious properties.

*See* Medicinal Plants.

## PROSOPIS SPICIGERA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Hamra, Semru ; *H.* Chaunkra ; *K.* Banni, Ukai ; *M.* Saunder, Shami.

CHAR. :—A moderate-sized deciduous thorny tree. *Bark* 2-2·5 cm. thick, grey, rough, with deep longitudinal fissures and horizontal cracks. Branches unarmed or covered with scattered, nearly straight prickles. *L.*—pinnate mostly 4, 2·5-5 cm. long ; leaflets 16-24, sessile, obliquely oblong cuspidate, small, grey, coriaceous. *Fl.*—small, yellow, in short-peduncled axillary spikes, 5-7·5 cm. long, and terminal panicles. Calyx minute, cup-shaped. *Fr.*—pod, straight, pendulous, glabrous, contracted between seeds. 10-20 × ·6 cm. filled with farinaceous edible substance. Seeds 5-15, brownish, oblong. *Fl. t.*—Feb.-Mar. *Fr. t.*—May-Aug. Sheds leaves Mar. and renews them soon after. Base of the stem often surrounded by a mass of stiff thorny branches and suckers.

DISTR. :—In the dry forests of the Deccan and Gujarat, Punjab, Rajasthan, Bundelkhand ; Western Peninsula ; Sind.

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GUMS & RESINS :—From the scars and wounds on the tree, a gum exudes. It is friable, occurs, in angular fragments of yellowish colour, sometimes in large avoid tears, often amber coloured internally but having frosted appearance externally due to minute cracks. With water it forms a dark-coloured, tasteless mucilage of about the same consistancy as gum arabic. This is a valuable gum and appears to resemble Mesquite gum of Mexico and Texas. The gum is well worthy of further investigation regarding its probable utility in arts and the degree to which it can be obtained.

*See* Dyes & Tans, Fodder Plants.

### PTEROCARPUS MARSUPIUM Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Iindian Kino tree, Malabar Kino tree; *G.* Bia, Bibla; *H.* Bija, Bigash, Hirdokhi; *K.* Benga, Bibla, Honnue; *M.* Bibla; *Tr.* Bijasal.

CHAR. :—A large deciduous tree, 15-18 m. high; girth 1·8-2·4 m. *Bark* grey, with long vertical cracks, exfoliating in small pices of irregular shape and size. Leaflets alternate, coriaceous, 5-7, obtuse, acute or emarginate. *Fl.*—numerous, yellowish-white, 1·3 cm. in diam., arranged in paniculate racemes. Petals twice the length of the calyx, waved or curled. Sheath of monodelphous stamens is sometimes deeply divided into 2. *Fr.*—pod, 2·5-5 cm. broad, articular. *Fl. t.*—May-June. *Fr. t.*—Dec.-Mar.

DISTR. :—Throughout the State in deciduous monsoon forests, scattered but not gregarious; ascends to 1,100 m. in Akrani Khandesh and Dangs. Common in N. Kanara, Konkan, Western Peninsula Madhya Pradesh and S. India; Ceylon.

GUMS & RESINS :—The commercial gum *kino* is obtained from this tree. It is obtained by making longitudinal cut down the stem of the tree, so that the wood is just exposed V shaped side cuts are then made to lead into this central channel; a bamboo tube is placed at the bottom of the main incision to catch the gum which flows out in liquid form. Tapping is usually done in the evening during February and March. In North Kanara the liquid is collected in cups made of leaves. The liquid gum is then strained to remove impurities and poured into shallow pans to dry. Good quality gum is of a ruby-red colour and contains about 73% of tannic acid. It is important as an astrigent in medicine and is one of the chief medical gums of the world. There is a good export trade of this gum.

*See* Medicinal Plants, Dyes & Tans, Oils, Fodder Plants.

## PUERARIA TUBEROSA DC.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Karwi-nai ; *H.* Tirra, Bedari-kund, *M.* Dari.

**SECTION 5.**

**Gums and Resins.**

CHAR. :—A large twiner with tuberous roots; stems shrubby. *L.*—3-foliate with long stalks; leaflets large — the terminal broadly ovate, equal-sided, the lateral ovate-oblong, inequilateral, silky beneath. *Fl.*—bluish, in lax leafless racemes; standard petal spurred. *Fr.*—Pod, membranous, flat, constricted between the seeds, clothed with long, silky, bristly brown hairs.

DISTR. :—Konkan — Karanja hill, Vengurla, Gujarat, Dangs, N. Kanara.

GUMS & RESINS :—The tuber when wounded exudes a bitter acid gum of an opalescent colour.

## SEMECARPUS ANACARDIUM Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Marking Nut Tree; *G.* Bhilamu; *H.* Bhela, Bhilava, Bilaran; *K.* Gerkayi, Keru; *M.* Biba, Bibwa.

CHAR. :—A moderate-sized deciduous tree; trunk erect, 9-12 m. high, girth about 1·2 m. *Bark* 1·3 cm., thick, dark brown, rough, exfoliating in very irregular inner patches; inner bark fibrous; dioecious; young branches, inflorescence, petioles and the under side of leaves covered with a short, pale pubescence. *L.*—23-47 × 13-31 cm., approximated near the ends of branches, oblong or obovate-oblong, rarely linear-oblong, usually contracted below the middle, rounded at the top, rounded, cordate or cuneate at the base, thick coriaceous, on rounded, thick petiole; nerves 16·25 pairs, conspicuous. *Fl.*—greenish-white or yellow, small, sub-sessile, fascicled, arranged in erect, large, terminal panicles as long as the leaves or shorter. Petals 3-4 times the length of the calyx, spreading, glabrous, Stamens 5, filaments slender; ovary densely tomentose. Styles 3. *Fr.*—drupe, obliquely oval or oblong, smooth, shining, purplish black; cup-shaped hypocarp, orange-red, fleshy and edible. *Fl. t.*—varies but generally in the hot season. *Fr. t.*—Nov.-Feb. Sheds leaves in Feb.; new leaves in May.

DISTR. :—In deciduous dry forests throughout the State. Abundant in dry forests of Konkan, Deccan and Gujarat; sub-Himalayan tract from the Beas eastwards; Assam, Khasia hills, Cittagong, Madhya Pradesh and W. Peninsula; E. Archipelago, Australia.

GUMS & RESINS :—The tree yields an acrid viscid gum from which a varnish is made. It is a coarse black gum in amorphous carbonaceous masses with a shining coal-like fracture and having a dull brownish-black colour. It is of very little use.

*See* Medicinal Plants, Dyes & Tans, Oils, Poisonous Plants and Fish Poisons.

## SESBANIA GRANDIFLORA Pers.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Agathio; *H.* Agusta, Bak, Rasna, Hatiya; *K.* Agase, Kempangase; *M.* Agasta, Aagati, Hadga.

CHAR. :—A short lived tree, 6-9 m. high, girth ·3-·6 m. *Bark* light brown, smooth. *L.*—15-31 cm. long, abruptly pinnate. Leaflets 40-60, 2·5-4 cm long, opposite, linear-oblong, obtuse, and often mucronate, entire, membranous, glabrous, pale-green, on short petiolules. *Fl.*—white or red, in short axillary racemes. Calyx 2·5 cm. long, glabrous. Corolla 7-10 cm. long. *Fr.*—pod 31 cm. or more, about 3 lin. broad, not torulose. Flowering and fruiting at all seasons of the year.

DRSTR. :—Grown all over the State, and in many parts of India; indigenous from Malaya to N. Australia.

GUMS & RESINS :—It yields a gum resembling *kino*; it is of a garnet red colour when fresh, but becoming almost black by exposure to the air. It is particularly soluble in spirit and also in water, leaving gelatinous residue of small bulk. It is very astringent.

*See* Medicinal Plants, Vegetables, Fodder Plants.

## STERCULIA FOETIDA Linn.

FAM.—Sterculiaceæ.

COM. NS. :—*E.* Bastard-Poon; *H.* Gangh-badam; *K.* Penari, Sembadi; *M.* Goldaru, Nagalkuda.

CHAR. :—A large deciduous straight, stout, handsome, stately tree; branches horizontal, verticillate; 24-27 m. high, girth 2·4-3 m. Glabrous except the very young leaves and shoots. *Bark* thick, whitish. *L.*—crowded at the ends of the thick branchlets on petioles, 20·8 cm., digitately 5-9 (11) foliolate; leaflets about 15·6 × 5·2 cm., elliptic-oblong or lanceolate, acuminate or cuspidate, entire, shortly petioluled, coriaceous. *Fl.*—polygamous, of a dull crimson colour, rather large, emitting a strong disagreeable smell, in lax, simple or branched racemes, about as long as the petioles; pedicels shorter than the flower, jointed in the middle. Bracteoles minute. Calyx 1·3-2·6 cm. diam., campanulate, deeply 5-cleft, glabrous externally and hairy internally, lobes lanceolate, spreading. Petals none. Staminal column bearing, several (12-15) sessile, 2-celled anthers. Carpels 5, villous. Style stalked, curved. *Fr.*—Follicle about 2-4 by 2½ in., glabrous, woody, boat-shaped, shortly beaked. Seeds 10-15, large, oblong, black, smooth. *Fl.*—Mar.-May. *Fr. t.*—beginning of rainy season. Sheds leaves in hot season.

DISTR. :—Common in Bombay, generally cultivated; found sparingly in wild state, throughout the States of Madras and Bengal Ceylon and Burma.

GUMS & RESINS :—The tree exudes a gum resembling tragacanth.

*See* Fibres.

## STEROSPERMUM PERSONATUM Chatterjee.

FAM.—Bignoniaceæ.

COM NS. :—*H.* Podal, Podiala, Pandri, Parur; *K.* Giri-hadari, Hude, Hulave, Kariguddada; *M.* Padal, Pahad, Parul, Patala.

CHAR. :—A large deciduous tree, 9-18 m. high; girth ·9-1·8 m. Young parts viscous hairy. *Bark* grey, exfoliating in large irregularly shaped, flat scales. *L.*—·3-·6 m., opposite, imparipinnate; leaflets 2-4 pairs, 7·5-15 × 6·3-8 cm., petioled, ovate or elliptic ovate, acuminate, almost entire or slightly serrate, downy when young, glabrous when old; petiole enlarged at the base. *Fl.*—·4 cm. long, of a dark, dull, crimson colour fragrant, glandular, puberulous, on slender pedicels, forming a large trichotomous viscid panicle. Calyx 4-cleft. Corolla campanulate, bilabiate. Clayx-lobes curled. *Fr.*—capsule. ·45-·6 m. × 7·5-10 cm. diam., darkgrey, rough with elevated white tubercles. Seeds with membranous pellucid wings. *Fl. t.*—Mar.-Apr. *Fr. t.*—Nov.-Dec. Leafless in Apr., new leaves in May.

DISTR. :—Monsoon-forests. In the deciduous forests of the State; common Dharwar and N. Kanara. Throughout moister India from sub-Himalaya (Terai) to Travancore and Tenasserim; Ceylon.

GUMS & RESINS :—The bark yields a gum; one of the dark coloured gums of the *Hog or tragacanth* series.

*See* Medicinal Plants.

## STERCULIA URENS Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*G.* Kada, Karai, Kaluri; *H.* Gulu, Gular, Karrai, Tabsi, Tanuku; *K.* Chauri, Chevoli, Kempudole, Savaya; *M.* Kandol, Karai, Kurku, Sarda, Saladhor.

SECTION 5.
Gums and Resins.

CHAR. :—A large deciduous tree, trunk erect, branches spreading, height 18-21 m., girth 2·4-3 m. *Bark* 1·34 cm., thick, very smooth, white or greenish-grey, exfoliating in large thin irregular paper flakes. *L.*—crowded at the ends of branches, 23·4-31·2 cm., long and broad, cordate at the base, usually 5-lobed; lobes entire, acuminate, membranous or somewhat coriaceous, tomentose beneath, nearly glabrous above; petioles 15·6-23·4 cm. *Fl.*—small, numerous, greenish-yellow, covered with a glutinous yellow tomentum; male and female mixed in much-branched panicles; pedicels furnished at their bases with linear bracts, deciduous after flowering. Calyx campanulate, 5-toothed. Corolla none. Filaments 10, alternately longer, united below into a thin sheath which encloses the base of the gynophore. Anthers large, alternately larger. Ovay supported on a thick gynophore. Style short and thick; stigma 5-lobbed. *Fr.*—of 5 radiating carpels 7·8 cm. long, orange to bright red, covered with dense tomentum, intermixed with stinging hairs. Seeds 3-6, oblong, black or chestnut coloured. *Fl. t.*—Dec.-Mar. *Fr. t.*—Apr.-May. Leafless in cold season; young leaves in hot season.

DISTR. :—Common near the coast on rocky soils in the Konkan and N. Kanara. Dry deciduous forest of Deccan districts. (Khandesh Satpudas). Sub-Himalayan tract from the Ganges eastwards in dry deciduous forests throughout the Peninsula; hills of Rajasthan, Madhya Pradesh Bihar. Dry forests of Burma.

GUMS & RESINS :—The tree produces karaya gum (Bassora type). It usually flows naturally from wound-holes due to decay or insects. It is not soluble in water readily and swells up into a mucilage. It is very astringent and is used medicinally. In recent years an increasing demand has arisen for this gum as an ingredient for face-creams, cosmetics and for thickening ice-cream.

*See* Fibres.

### STREBELUS ASPER Lour.

FAM.—Moraceæ.

COM. NS. :—*H.* Dabia, Kurchana, Rusa, Sahora, Sihaura; *K.* Mitlia, Mittelgidda, Punje; *M.* Karvati, Kharota, Paraya, Poi.

CHAR. :—A small evergreen tree, 7·5-10·5 m. high, girth ·9-1·2 m. (some-times more). Generally a small scraggy-looking tree. *Bark* grey, soft, irregularly ribbed. All parts harshly hoary. *L.*—3-10 × 2·5-5 cm., elliptic, rhomboid, oblong or obovate, obtuse or shortly acuminate, irregularly dentate, rough on both sides with minute raised dots. *Male fl.*—in short, pedunculate, globose axillary heads. *Female* axillary, 1-2 together on slender longer peduncles. *Fr.*—drupe, size of a pea, 1-seeded, yellow, partly enclosed in the enlarged perianth which is also yellow. *Fl. t.*—Jan.-Mar. *Fr. t.*—Apr.-May.

SECTION 5.
—
Gums and Resins.

DISTR :—Throughout the State in dry open forests; common also found in the evergreen forests of N. Kanara. Throughout the drier parts of India, from Rohilkhand eastwards to Bengal, and southwards to Travancore; Ceylon.

GUMS & RESINS :—A white resin is exuded by the tree.

*See* Fodder Plants.

### SWIETENIA MAHAGONY Linn.

FAM.—Meliaceæ.

COM. NS. :—*E.* The Mahogany tree; *M.* Mahagony.

CHAR. :—A large evergreen tree, with abruptly pinnate leaves; very glabrous, leaflets opposite, 6-10, obliquely-ovate, acuminate. *Fl.*—small in axillary or sub-terminal panicles, greenish-yellow. Calyx small 5-cleft; petals 5, spreading; staminal tube urn-shaped, 10-toothed. *Fr.*—capsule, 5-celled about 7·5 cm. in diameter.

DISTR. :—It is a native of Central America and the West Indies. It was introduced at Dapuri, Hewra (Poona district), Calcutta, Sikkim to Saharanpur and grows well. Much cultivated in India in gardens, avenues and forest plantations.

GUMS & RESINS :—The tree yields a gum, which, at first, is liquid but soon dries up into brittle, white, shining fragments; these become yellow on keeping. The gum readily dissolves in water forming a weak-dark coloured mucilage.

### TAMARIX DIOICA Roxb.

FAM.—Tamaricaceæ.

COM. NS. :—*H.* Laljhav.

CHAR. :—A very graceful gregarius shrub or small tree; trunk short, 1·8-2·1 m. high, rarely 4·5 m., branches with drooping extremities. *Bark* grey, with reticulate cracks, showing the red inner bark. *L.*—small, scale--like, tubular, sheathing, obliquely-truncate and pointed, glabrous and green. *Fl.*—dioecious, numerous, sessile, rose-coloured, in teminal panicled spikes. Bracts acuminate. *Male fl.*—stamens 5, inserted in the notches of disc, anthers sagittate, purple. *Female fl.*—stamens abortive. *Fr.*—capsule, oblong, tapering. *Fl. t.*—May-July. *Fr. t.*—cold season.

DISTR. :—Common in the beds of the Konkan and Deccan rivers; Cutch; Bengal, Punjab, and almost all over India near river beds and the sea-coast; Sind, Burma, Cultivated in the gardens, GUMS & RESINS :—The tree yields a gum. It occurs in nodules, highly friable, of granular texture; The nodules appear to be opaque or pale yellow, the centre of each nodule being more transparent and of red colour. It has a peculiar taste — combination of bitter with sweet; quite soluble in water.

*See* Dyes & Tans.

## TECTONA GRANDIS Linn.

FAM.—Verbenaceæ.

COM. NS. :—*E.* Indian Oak, Ship-Tree, Teak; *G.* Sag, Sagach; *H.* Sagun, Sagwan; *K.* Tega, Tegu; *M.* Sag, Sagwan; *Tr.* Teak.

CHAR. :—A large deciduous tree, 21-30 m. high, girth 3·6-4·5 m. (occasionally exceeding 6 m.). *Bark* light-brown or grey, fibrous, with shallow longitudinal cracks, outer bark peeling off in long thin flakes. Branchlets quardrangular, Channelled, stellately tomentose. *L.*—opposite 30-60 × 15-30 cm. (much larger in seedlings), rough above, grey, tomentose beneath. *Fl.*—shortly pedicelled in cymes. Corolla tubular, 5-6 lobes, lobes unequal, white. *Fr.*—sub-globose, somewhat 4-lobed, pericarp dense hairy, endocarp bony. *Fl. t.*—June-Sept. *Fr. t.*—Nov.-Jan. Sheds leaves early in cold season, new foliage in May.

DISTR. :—Throughout the State in monsoon and mixed deciduous forests; abundant all along the slopes of Western ghats to the Mahi river in Gujarat. Best teak-forests in Mysore State are on the slopes of Kalinadi and the Gangavali rivers of N. Kanara. Western ghats of Madras State, Circars, Madhya Pradesh; Malaya, Peninsula, Burma, Sumatra, Java.

GUMS & RESIN :—A rather liquid black resin (tar) may be prepared by destructive distillation of the wood. It is made in S. India and Burma, for medicinal purposes.

*See* Medicinal Plants, Oils, Dyes and Tans, Fodder Plants.

## TERMINALIA ARJUNA W. & A.

FAM.—Combretaceæ.

COM. NS. :—*E.* White Murdah; *G.* Arjun-Sadada, Dadado; *H.* Arjan, Arjuna, Kahu, Koha; *K.* Hole-matti; *M.* Arjun, Arjuna-sadada; *Tr.* Arjun.

CHAR.:—A large deciduous tree with thick buttressed trunk and horizontally spreading branches, about 24 m. high, girth 3·6 m. *Bark* smooth, pinkish-grey, the old layers peeling off in thin flakes. *L.*—13-20 cm., sub-opposite, coriaceous, glabrous when old, oblong or elliptic, often suddenly narrowed or cordate at the base, obtuse or acute at the apex; petiole with 2 glands near its apex, or at the base of the leaf. *Fl.*—dull-yellow disposed in pedunculate, terminal and axillary spikes, usually panicled. *Fr.*—2·5-5 cm., coriaceous; thick wings, truncate or narrowed at the summit, marked with ascending cross lines. *Fl. t.*—Apr.-May. *Fr. t.*—end of rainy and cold season.

DISTR.:—Along banks of rivers and streams, very common in south Konkan and jungles south of Surat, Matheran, S. M. Country (Belgaum); throughout the greater parts of India in the Sub-Himalayan tracts, Chota-Nagpur, Madhya Pradesh, Madras State: Ceylon.

GUMS & RESINS:—The tree yields a gum. It is a clear, golden brown, transaprent gum, and is met with, in the bazars of Northern India, as a drug.

*See* Medicinal Plants, Dyes and Tans, Fodder Plants.

## TERMINALIA BELERICA Roxb.

FAM.—Combretaceæ.

COM. NS.:—*E.* Bastard Myrabolan, Bedda Nut, Beleric Myrabolan; *G.* Behedo, Beheza, Bera; *H.* Bahara, Buhura, Sagona; *K.* Shantimara, Tare, Vibhata; *M.* Beheda, Bela; *Tr.* Behera.

CHAR.:—A large handsome deciduous tree 18-30 m. high, girth 2·4-6 m. *Bark* bluish or ashy-grey with numerous fine longitudinal cracks, yellow inside. Young branchlets and calyx clothed with rusty pubescence. *L.*—7·5-15 cm. crowded at the end of the branches, alternate, coriaceous, broadly-elliptic or obovate-elliptic, obtuse, retuse, or short-acuminate at the base, often unequal at the base, deciduous; petioles 2·5-6·5 cm. *Fl.*—small, grey or greenish-yellow with an offensive smell, arranged in simple solitary, axillary or infra-axillary spikes, upper-flowers of the spike male, lower hermaphrodite. Calyx pubescent with long rusty hairs inside. *Fr.*—1·3-2 cm. diam., ovoid, grey, when dry obscurely 5-angled. *Fl. t.*—Feb.-May. *Fr. t.*—following rainy and cold season. Sheds old leaves Feb.-March.; new leaves Apr.

DISTR.:—Common throughout the State, in deciduous mixed monsoon forests, in Khandesh, Akrani upto 1,200 m. Throughout the forests of India, Rajasthan, Sind, Ceylon.

GUMS & RESINS:—From wounds in the bark large quantities of an insipid gum exude. The gum is in vermicalar pieces, about the thickness of a finger, of the colour of inferior gum-arabic; it is hardly soluble in water and swells up and forms a bulky gelatinous mass. The gum is of the Bassora type. It is collected and mixed up with soluble gums for sale as country gum.

*See* Medicinal plants, Oils, Dyes & Tans, Fodder plants.

## TERMINALIA CHEBULA Retz.

FAM.—Combretaceæ.

COM. NS. :—*E.* Black or Chebulic-myrabolan; *H.* Hirdo, *H.* Har, Harara, Haria; *K.* Alate, Harade, Haritaki; *M.* Hirda.

CHAR. :—A moderate-sized much-branched deciduous tree, 7·5-10·5 m. high, in favourable circumstances 24-30 m.; girth 1·5-3·6 m. *Bark* dark-brown with numerous generally shallow vertical cracks. Young parts more or less rust-coloured or silvery-hairy. *L.*—not clustered, mostly sub-opposite, ovate, or elliptic-ovate, acute and rounded at the base, 7·5-13 cm., deciduous; petiole often with 2 glands near the summit. *Fl.*—All hermaphrodite, dull-white or yellowish, subtended with a downy bracteole, arranged in terminal often panicled, spikes, 5-10 cm. long. *Fr.*—ellipsoidal or obovoid from a cuneate base, more or less distinctly 5-angled. *Fl. t.*—May-June. *Fr. t.*—in the next cold season. Sheds leaves in Feb.-Mar.; new leaves in Apr.

DISTR. :—Moist parts of the Deccan, on trap and common along ghats, common in Khandesh, Akrani, monsoon forests of Belgaum district and N. Kanara. Throughout the greater part of India upto 1,500 m. in the Himalayas, Travenacore, Burma, Ceylon.

GUMS & RESINS :—The tree yields a gum which is said to be largely collected in Berars and mixed with gums of Babul, Dhavada, Mohra, and Neem and sold either for medicinal purposes or to dyers to mix with their colours.

*See* Medicinal Plants, Oils, Dyes & Tans, Fodder Plants.

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## TERMINALIA TOMENTOSA W. & A.

FAM.—Combretaceæ.

COM. NS. :—*G.* Hadri, Sadri; *H.* Asan, Sadri, Sain, Saj; *K.* Banapu, Kare-Matti, Matli; *M.* Ain, Madet; *Tr.* Laurel.

CHAR. :—A large deciduous tree, 24-30 m. high, girth 2·4-3 m. *Bark* 2·5 cm. thick, grey to black with long, broad, deep longitudinal fissures, and short, shallow, transverse cracks; inner substance red when fresh. Branch lets, young leaves, and inflorescence rusty-tomentose. *L.*—7·5-23 cm., sub-opposite or alternate, elliptic, ovate or obovate-oblong, glabrous or hairy when old, coriaceous, cordate or suddently narrowed at the base into short petioles, with 2 glands near the base of the midrib. *Fl.*—of a dull-yellow colour in panicled spikes. *Fr.*—2·5-5 cm., obovoid-oblong, wings broad, marked with prominent horizontal lines; edges of wings thin, irregularly crenulate. *Fl. t.*—Apr.-May. *Fr. t.*—Jan.-Apr. of next year. Sheds leaves Jan.-Mar.; new leaves at the end of hot season.

**SECTION 5.**
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**Gums and Resins.**

DISTR. :—Common throughout the State in mixed deciduous forests, and in the jungles at the foot of the ghats in Konkan, throughout the moist regions of India : Ceylon.

GUMS & RESINS :—The tree exudes a gum, almost colourless but often of a brownish tinge. The gum is used as incense and as a cosmetic. It is said to be eaten by Santals.

*See* Dyes & Tans, Fodder Plants.

## TOONA CILIATA Roem.

FAM.—Meliaceæ.

COM. NS. :—*E.* Red or Moulmein Cedar, Toon Tree ; *H.* Lim, Mahanim, Tuni ; *K.* Devdari, Gandagheri, Kempu, Tundu ; *M.* Huruk, Maha-nim, Tadu ; *Tr.* Toon.

CHAR. :—A large deciduous tree, 18-24 m. high, (more under favourable circumstances) ; 1·8-2·4 m. in girth. *Bark* dark grey-brown, exfoliating when old in irregularly woody scales ; inner bark red, glabrous. *L.*—·3-·9 m. long, abruptly pinnate, deciduous. Leaflets 8-30, 5-18 × 2-8 cm., generally opposite or sub-opposite, obliquely ovate or lanceolate, acuminate or cuspidate, entire or slightly undulated or serrate, shining above and sometimes glaucescent beneath, on a rather long petiole. *Fl.*—white, fragrant, on slender short pedicels, arranged in large drooping, terminal panicles, about the length of the leaves or longer. Calyx segments 5, short, round. Petals 5, oblong ciliate. Stamens 5, occasionally 6, alternating with staminodes, inserted on orange-coloured hairy lobes of the disc. Ovary 5-celled. *Fr.*—capsule, oblong, about 2-2·6 m. long. Seeds compressed, winged below or at both ends. *Fl. t.*—Jan.-Feb. *Fr. t.*—Mar.-Apr.

DISTR. :—Ravines of Khandala ; more or less abundant in the evergreen forests of the Konkan and N. Kanara. Forests of the sub-Himalayan tracts and valleys of N. W. Himalayas in the Punjab and eastwards chiefly along streams upto Sikkim and Assam. Eastern Bengal. Throughout Western and Southern India at low elevations : Burma. Often planted in avenues and gardens.

GUMS & RESINS :—It yields a resinous gum which is brown and astringent.

*See* Medicinal Plants, Dyes & Tans, Fodder Plants.

## VATERIA INDICA Linn.

FAM.—Dipterocarpaceæ.

COM. NS. :—*E.* Indian Copal or Piney Varnish tree, Malabar White Pine ; *K.* Dhupada, Gugle, Illupathla, Munda dhupa ; *M.* Dhupa ; *Tr.* Vollapiney.

CHAR. :—A large handsome evergreen tree, young shoots and inflorescence clothed with scurfy stellate tomentum; stem cylindrical, sometimes 1·5 m. in diameter. *Bark* whitish-grey, round, peeling off in round thick flakes. *L.*—coriaceous, glabrous, elliptic-oblong, blade 10·4-26 cm. long, petiole 2·6-4 cm. long; midrib and secondary nerves (14-16 pairs) prominent beneath. *Fl.*—1·34 cm. across, in large terminal panicles. Petals spreading slightly pubescent outside, stamens 40-50, filaments short, anthers linear, hairy at the base. Ovary tomentose. *Fr.*—ovoid, 5·2-6·54 cm. long, splitting open in 3 valves. Cotyledons filled with fat (piney tallow). *Fl. t.*—Mar.-Apr. *Fr. t.*—rainy season. Young leaves appear in cold season.

DISTR. :—Evergreen forests along the Western ghats. This tree was formerly planted along the avenues and roads in N. Kanara by the Sonda Kings; Western India; also planted in the moister districts of Mysore; abundant in S. Kanara.

GUMS & RESINS :—The tree yields a true resin of considerable value known as *White-dammar* or Piney-resin. It is obtained by incisions in the stem. It occurs in three forms (1) Compact Piney-resin, in lumps of all shapes, which vary in colour on the outside from bright orange to a dull yellow, has a bright vitreous fracture and internally presents all shades of colour from light-green to light yellow. It is very hard and resembles amber. (2) Celluler Piney-resin occures either in small lumps or in large masses, generally of a shining appearance and balsamic smell. It has a distinct cellular structure. It varies in colour from light-green to yellow or white and is usually transparent, though occasionally for want of ease in preparation, more opaque, of a dull green colour and full of air bubbles. (3) Dark coloured Piney-resin in occasionally obtained on splitting open old and decayed trees. It has the solid consistence of the first, but the inferior quality of the second variety. Indian Dammer or Indian Copal is most important from the commercial point of view as it dissolves readily in turpentine, and is in constant demand for the manufacture of varnishes. Varnish is prepared from the resin by boiling it in linseed oil. The varnish is used for coating furniture and other works. The varnish made with alcohol might be used with advantage for varnishing pictures. On the Malabar coast it is made into candles which diffuse an agreeable fragrance, and gives a clear light and little smoke. It is said that the candles were at one time introduced into England. The best pieces of resin are employed as ornaments under the name of amber; mixed with oil it makes an excellent ointment for application in cases of chromic rheumatism. In South Kanara it is mixed with Undi-seed oil or fish oil and used for caulking boats, and for setting gold ornaments.

*See* Medicinal Plants, Oils.

## XYLIA DOLABRIFORMIS Benth.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Iron Wood tree of Pegu and Arakan; *H.* Jambu; K. Jambe, Tirawa; *M.* Jambha, Suira, Yerul; *Tr.* Irul.

**SECTION 5.**
—
**Gums and Resins.**

CHAR. :—A large deciduous tree, 15-18 m. (sometimes 30 m.) high; girth 2·6-3·6 m. *Bark* grey or reddish-brown, with short cracks irregularly distributed, scaling off in great thick irregular patches. *L.*—bipinnate, pinnae 2; leaflets 4-10, opposite, oblong, acute, sub-coriaceous, 7·5-15 cm. long, the terminal leaflet much larger. *Fl.*—yellowish, sessile, in dense peduncled heads, crowded on 2·5-5 cm. long peduncles arising from above the scars of the fallen leaves. Corolla small. Stamens 10. *Fr.*—pod, woody, falcate, flat, greyish-brown, 10-15 × 2·5-6·3 cm., 6-10 seeded. *Fl. t.*—Mar.-Apr. *Fr. t.*—Oct.-Nov. Sheds leaves during hot season.

DISTR. :—Throughout the deciduous forests from Kolaba district to Savantwadi; Madhya Pradesh, South India; Burma, Singapore and the Philippines.

GUMS & RESINS :—It yields a red resin, which is said to be more abundant in Burmese than in the South Indian woods.

*See* Oils, Fodder Plants.

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## SECTION 6—FOOD PLANTS.

### VEGETABLES.

### ALLIUM CEPA Linn.

FAM.—Liliaceæ.

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Food Plants.
Vegetables.

COM. NS. :—*E.* Onion ; *G.* Dungli ; *H.* Piaz ; *K.* Ullegaddi ; *M.* Kanda.

Onion is an important crop grown on a field scale. It has been cultivated in India from ancient times. It is grown all over in the State. The total area occupied is about 20,063 acres. Out of this about 32 % is grown extensively in Nasik District. The onion bulbs and young leaves are used as vegetables.

Red and white varieties are usually grown.

*See*—Medicinal Plants.

### AMARANTUS BLITUM Linn. *var.* oleracea Hk.

FAM.—Amaranthaceæ.

COM. NS. :—Pokla.

A tall succulent herb grown as a pot herb in the gardens throughout the year. There are two varieties, green and red. Both are used as vegetables.

### ATRIPLEX HORTENSIS Linn.

FAM.—Chenopodiaceæ.

COM. NS. :—*M.* Chandanbatwa.

An erect succulent annual tinged with red or purple. It is cultivated to a small extent in garden lands at all times of the year. The leaves and tender stems are used as a vegetable.

### ALLIUM ASCALONICUM Linn.

FAM.—Liliaceæ.

COM. NS. :—*E.* Shallot.

A bulbous plant with purple flowers. A native of Palestine. Occasionally grown in the gardens in the Bombay State. Bulbs are used for seasoning culinary preparations and for pickling. They are used similarly to onions. Leaves are eaten when young and green.

### ALLIUM PORRUM Linn.

FAM.—Liliaceæ.

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COM. NS. :—*E.* Leek.

Hardy biennial plants. Occasionally cultivated in the gardens in the Bombay State. Lower part of the leaves which forms an elongated bulb, it is succulent; it is used as a vegetable; also used as a pot-herb.

### BASELLA RUBRA Linn.

FAM.—Chenopodiaceæ.

COM. NS. :—*G.* Maya-ki-bhaji; *H.* Poi; *M.* Mayaloo, Vel-bondi.

A twining fleshy herb grown usually on hedges near houses. According to Roxburgh, there are three cultivated varieties, a red and a white stemmed, that are raised from seeds and a larger sort which is always propagated by slips. The succulent leaves and stems are used as vegetable and made into curries. *Bhajias* are also prepared from the leaves. It is a very wholesome vegetable.

*See*—Medicinal Plants, Dyes and Tans.

### AMORPHOPHALLUS CAMPANULATUS Blume.

FAM.—Araceæ.

COM. NS. :—*E.* Elephant's foot; *G.* Suran; *K.* Surangaddi; *M.* Suran.

It is a native of India and Ceylon and is cultivated throughout the Peninsula. In the State, it is grown as a *kharif* crop supplemented with well-irrigation in Konkan and as a garden crop with irrigation in Deccan and Gujarat, the total area being about 592 acres.

The corms are used as vegetable. They keep good for a fairly long time if kept in a dry place and can be used whenever required.

*See*—Medicinal plants.

### APIUM GRAVEOLENS Linn.

FAM.—Umbelliferéæ.

COM. NS. :—*E.* Celery.

A hardy biennial. A native of temperate Europe.

Grown in the gardens in the State. Leaf-stalks are used as vegetable and for flavouring purposes. Extremely popular amongst the Europeans.

*See*—Medicinal Plants, Oils.

## AMARANTUS PANICULATUS Linn.

FAM.—Amaranthaceæ.

COM. NS. :—*G.* Rajagro ; *K.* Rajgiri ; *M.* Rajgira.

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It is grown in gardens and fields throughout the year, all over the State. The leaves are used as a vegetable and the parched seeds are eaten, on fast-days mixed with sugar and turned into porridge or *ladus*. The seeds are reported to be very rich in high quality proteins.

## AMARANTUS POLYGAMOUS Linn.

FAM.—Amaranthaceæ.

COM. NS. :—*M.* Tandulja.

A plant of spreading habit with stems and leaves uniformly green. Generally found as a weed in fields ; rarely grown in gardens. The leaves are used as a vegetable.

## AMARANTUS TRICOLOR Linn.

COM. NS. :—*M.* Math.

Cultivated in gardens throughout the year. It has two varieties red and green. The green variety is shorter than the red one. The shoots and leaves are used as vegetable.

## BENINCASA CERIFERA Savi.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Ash-gourd, White Pumpkin, White-gourd melon ; *G.* Kohala, *H.* Golkaddu ; *K.* Sandigumbala ; *M.* Kohala.

The plant is said to be a native of Japan and Java. In the State, it is cultivated occasionally in gardens during the rainy season. The fruit averages five lbs. in weight and is eaten as a vegetable. It is cut in small pieces which are dried and fried as condiments. It is principally used in making sweet-meats. It is said to have cooling properties.

*See*—Medicinal Plants, Oils.

## BETA VULGARIS Linn.

FAM.—Chenopodiaceæ.

COM. NS. :—*E.* Beet, Beetroot. *H.* Chukanda.

A plant with large fleshy globose succulent roots which are usually red but sometimes pink or whitish. It is cultivated in gardens, throughout the year for the fleshy roots. There are two main varieties of beetroot, one is short and round and the other is long and slender. The roots are used as vegetable or eaten as salad.

A variety of beet is grown in Europe and other temperate countries for producing sugar.

### BRASSICA CAMEPESTRIES *var.* rapa Linn.

FAM.—Crucifereæ.

CON. NS. :—*E.* Turnip.

It is often cultivated in gardens for its large tuber-like roots which are used as vegetable or eaten as salad.

*See*—Oils.

### BRASSICA OLERACEA. *var.* capitata Linn.

FAM.—Crucifereæ.

COM. NS. :—*E.* Cabbage ; *G.* Kobji, Pangobi ; *H.* Kobi ; *K.* Kobi-gaddi ; *M.* Kobi.

It is a much valued, cold season vegetable grown throughout India. In the State, it is practically grown all over and more largely in Gujarat, in cold season. The area occupied by the crop is about 3,063 acres. There are two varieties of cabbage. One drum head type, which is early, large and green. The other one is sugar leaf type which is conical and hollow.

The cabbage heads are used as vegetable and the outer leaves are fed to cattle.

### BRASSICA OLERACEA *var.* botrytis Linn.

COM. NS. :—*E.* Cauliflower. *M.* Phulvar.

It is generally grown along with cabbage in mixture. Rarely it is cultivated as a sole crop. The flowery head is used as a vegetable. The leaves are sometimes used as vegetable or fed to cattle.

### BRASSICA OLERACEA *var.* caulocarpa Linn.

COM. NS. :—*E.* Knolkhol ; *M.* Navalkol.

It is generally grown along with cabbage in mixture or cultivated as a sole crop. The succulent stem is used as a vegetable,

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## CANAVALIA ENSIFORMIS D. C.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Jack or Sword Bean; *G.* Abao; *H.* Kadasambal; *K.* Shembi avare, Tumbekonji; *M.* Abai.

A large perennial climber grown near houses and on trees and hedges throughout the year, all over the State.

*Var. fruticosa—M.* Pandhari Abai is grown in gardens, during the rains principally in the Deccan and Khandesh. The seeds and pods are eaten as vegetable.

*See*—Medicinal Plants.

## CARTHAMUS TINCTORIUS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Safflower; *G.* Kusumbi; *H.* Kusum; *K.* Kusibe; *M.* Kardai.

It is grown in gardens at any time of the year. The tender stems and leaves which have no spines are utilised as a vegetable.

*See*—Medicinal Plants, Oils, Dyes and Tans.

## CHENOPODIUM ALBUM Linn.

FAM.—Chenopodiaceæ.

COM. NS. :—*K.* Hunchik; *M.* Chakvat.

A tall herb usually grown in gardens or in corners of early grain fields. It also occurs as an escape.

It is used as a vegetable.

*See*—Medicinal Plants.

## CICER ARIETINUM Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Gram; *G.* Chana; *H.* Chana; *K.* Kadale; *M.* Harbara.

Gram is chiefly grown for pulse. But both the leaves and the green grains are used as a vegetable.

*See*—Medicinal Plants.

## CITRULLUS VULGARIS Schrad *var.* fistulosus stock.

FAM.—Cucurbitaceæ.

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COM. NS. :—Dilpasand.

The variety is generally cultivated in hot season in Gujarat but is not common in other districts of the State. The fruit is of the size of a big orange. When ripe, it is pure, white, pale-yellow or red. The fruit is eaten, cooked as a vegetable.

## COCCINIA INDICA W. & A.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Little gourd ; *G.* Gilodia ; *K.* Tondlikai ; *M.* Tondli.

It is a climbing herb. It is cultivated as a perennial crop mostly in Kolaba and Thana districts of the State, occupying about 280 acres. It is occasionally grown in gardens near the houses and in bungalow compounds. There is a wild variety growing in hedges ; the fruits of this variety are bitter. The fruits of the cultivated variety are cooked as a vegetable or eaten raw.

*See*—Medicinal Plants.

## COLOCASIA ANTIQUORUM Schott.

FAM.—Araceæ.

COM. NS. :—*G.* Alvi ; *H.* Kachu ; *K.* Shyami ; *M.* Alu.

This is found wild in marshy places. The crop is rarely grown on a large area. It is generally found grown in the back-yards of houses where house sewage accumulates. There are at least two varieties, one with dark purple stalks and leaves and the other in which these are green. The corms, leaf-stalks and leaves are used as vegetable.

## CORIANDRUM SATIVUM Linn.

FAM.—Umbelliferեæ.

COM. NS. :—*E.* Coriander ; *G.* Dhana ; *H.* Dhania ; *K.* Haveeja ; *M.* Kothimbir.

It is cultivated almost everywhere for its seeds and leaves. Leaves when green are used as a vegetable and for flavouring curries and *chutnies*.

*See*—Medicinal Plants, Oils, Condiments and Spices.

## CUCUMIS MELO Linn. *var.* utillisima.

FAM.—Cucurbitaceæ.

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COM. NS. :—*M.* Tarkakdi.

The tender fruits are eaten both raw and cooked. They are also salted and used in salads.

It is cultivated in river beds in the Deccan on a small scale. Roxburgh has the following interesting note on the fruit of this plant :—"This appears to me by far the most useful species of Cucumis that I know; when little more than half grown, they are oblong and a little downy; in this State, they are pickled; when ripe they are as large as an ostrich-egg, smooth and yellow; When cut they have much the flavour of the melon and will keep good for several months, if carefully gathered without being bruised and hung up; they are also at this stage eaten raw and much used in curries by the natives. The seeds like those of the other cucurbitous fruits contain much farinaceous matter blended with large proportion of a mild oil; the natives dry and grind them into meal, which they employ as an article of food.".

*See*—Medicinal Plants.

## CUCUMIS SATIVUS Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Cucumber; *G.* Kakdi; *K.* Savatikai; *M.* Kakdi, Khira.

This is said to be a native of Northern India. It is largely cultivated in the State throughout the year. There are two varieties (1) Hot weather one with an egg shaped fruit having smooth whitish skin. (2) The rainy season one has larger fruit having green skin. The fruit is extensively used in the raw state as a salad and in the cooked state as a vegetable. The fruit forms an important article of food during hot weather. It is nourishing and useful in quenching thirst. Seed kernels are edible and are used in confectionary.

*See*—Medicinal Plants, Oils.

## CUCURBITA MAXIMA Duchesne.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* The great or Red Pumpkin, Spanish Gourd; *G.* Sakkar kohala; *H.* Kaddu; *K.* Kumbalkai; *M.* Tambada Bhopala.

It is cultivated throughout India. In the State it is usually grown round the edges of garden lands. In Konkan the creepers are allowed to trail to the ground or on house tops. There are three common varieties. (1) round fruit, (2) elongated fruit and (3) flattened fruit.

The fruit is used as vegetable. It will keep for a month or more after picking. Flowers are sometimes cooked and eaten as vegetable. Tender shoots and leaves are eaten as salad.

*See*—Medicinal Plants, Oils.

### CUCURBITA PEPO D. C.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Pumpkin, Vegetable Marrow; *M.* Kashiphal.

It is said to be a native of America. It is grown on a small scale in the State. The fruit is used as a vegetable. Seeds are also eaten.

*See*—Medicinal Plants, Oils, Sacred Plants.

### CUCURBITA MOSCHATA Duchesne.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Musk Melon; *M.* Kala Bhopala.

It is largely cultivated in India and in most tropical and sub-tropical countries. "The fruit is of various shapes-ovoid, clavate or sub-globose and depressed at the apex and base and more or less ribbed, dark green when young, covered with delicate glaucous bloom when ripe" (Duthie).

The fruits are used as vegetable.

*See*—Oils.

### CYAMOPSIS TETRAGONOLOBA D. C.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Cluster bean ; *G.* Guar : *H.* Gasara ; *K.* Chavalikai ; *M.* Guvar.

The crop is grown both as a *kharif* and a *rabi* crop. It is grown mixed with other crops or as a sole crop. It is extensively grown in Gujarat and to a lesser extent in other parts of the State The total area cultivated is about 28·033 acres. There are four chief varieties (1) Pardeshi, (2) Deshi, (3) Makhania, (4) Sotya guvar. There are two other varieties not very common—Cluster guar of Nadiad and Bushy guar of Dharwar. The pods are used as vegetable. The seed is used as a pulse also. The grains and green stalks are fed to cattle.

*See*—Fodder Plants.

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### CYNARA SCOLYMUS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Globe Artichoke.

A hardy perennial plant with large, handsome deeply cut leaves; a native of Barbary. Occasionally grown in the gardens in the State. The tender unexpanded, round or broadly cone-shaped flower-heads are used as vegetable.

### DAUCUS CAROTA Linn.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Carrot; *G.* Gajar; *K.* Gajjare; *M.* Gajar.

The crop is grown either in kharif or rabi season. It is grown all over the State. The total area cultivated is about 5,209 acres.

The carrot is a common plant in parts of Europe where it is grown for its tender well flavoured roots.

The long conical yellow or pink roots are cooked and used as vegetable. They are also eaten raw or in salad. Coarser varieties are also grown for feeding horses. Leaves are fed to cattle.

Woodrow says that the Deccan carrot is a root of good flavour but small and very uncultivated looking.

*See*—Medicinal Plants, Oils.

### DIOSCORIA L.

FAM.—Dioscoraceæ.

Herbs with slender twining or procumbent stems, bearing large or small subterranean tubers.

### DIOSCOREA ACULEATA Linn.

*E.* Chinese Yam, Goa Potato; *M.* Kangar, Tubers clustered, flesh white and oval.

Grown in the moister tracts such as the Konkan and N. Kanara.

### DIOSCOREA ALATA Linn.

Tubers large, generally 2 at each root; oblong or tapering, white within and without.

Grown in gardens in the Deccan, Konkan and Gujarat.

### DIOSCOREA ALATA L. *var.* globosa Prain.

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G. Kamodio.

Tubers rounded, large, white fleshed and have a fragrant smell like *kamod* rice.

Grown chiefly in Gujarat.

### DIOSCOREA ALATA L. *var.* rubella.

Tubers purple outside and the flesh white.

Grown in Gujarat.

### DIOSCOREA ALATA L. *var.* purpurea.

Tubers with purple skin and flesh. They are long, large in the middle and taper to each end.

This is a local variety of Gujarat.

### DIOSCOREA BULBIFERA Linn.

*M.* Kadu Karanda.

This is a wild plant. Tubers are yellow fleshed and acrid and therefore require special preparation before being used as food.

### DIOSCOREA BULBIFERA Linn. *var.* sativa Prain.

*E.* Yam; *G.* Goradu; *H.* Ratalu; *K.* Heggenasu; *M.* Goradu, Karanda.

Tubers large and long; skin dark brown, flesh white. This is the commonest of the yams. Submerial bulbils are also present. Grown largely in Gujarat and to a small extent in Konkan, Deccan and Kanara. The area occupied is about 196 acres.

All the above tubers of the different Diocoreas are used as a vegetable baked, cooked or fried.

### DOLICHOS LABLAB Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Val; *K.* Avare; *M.* Ghevda.

Twining or sub-erect herbs grown in gardens for the pods. There are two main varieties. Dolichos lablab L. and Dolichos lablab L. *var.* lignosus Prain.

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**DOLICHOS LABLAB L.** has two varieties.

1. *Var. 1.* White flowered ghevda. Extensively cultivated in the Konkan (at Bassein near Bombay). Pods are used as vegetable.
2. *Var.* 2. Pavata. Cultivated in the Konkan in fields as a rabi crop following rice. Pods are used as vegetable and leaves as fodder.

**DOLICHOS LABLAB L.** var. **lignosus Prain.** has six varieties—

1. Ghevda—*Bandval* (Konkan).

   This is the largest and strongest variety growing in the Konkan.
2. Kathiavadi Ghevda.

   Seen only at Bassein in cold season.
3. Ghevda—*Lalgunj* (Bassein).
4. Ghevda—*Val papadi* (Konkan).
5. Kadva—Largely cultivated after rice in the *rabi* season in the Konkan and in other parts where rice is grown.
6. Ghevda (Poona).

   Pods of all these varieties are eaten as vegetable.

*See*—Fodder Plants.

### HETIANTHUS TUBEROSUS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Jerusalem or Root Artichoke.

A hardy tuberous—rooted herbaceous perennial. A native of N. America. Occasionally cultivated in the gardens in the State. Roots are used as vegetable, more generally for flavouring purposes.

### HIBISCUS CANNABINUS Linn.

FAM.—Malvaceæ.

COM. NS. :—*G.* Ambadi; *K.* Pundi; *M.* Ambadi.

Largely cultivated throughout the rains; usually grown with other crops or sometimes used as a border to the fields.

The tender leaves are used as vegetable.

*See*—Fibres.

## HIBISCUS ESCULENTUS Linn.

FAM.—Malvaceæ.

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COM. NS. :—*E.* Lady's fingers ; *G.* Bhinda ; *K.* Bhendikai ; *M.* Bhendi.

Cultivated throughout the State and throughout the year as a garden crop. The area under cultivation is about 6,429 acres.

There are two varieties :—(1) Early called *Bhendigari*—the fruits are thin, long and smooth. (2) Late called *Hali*—the fruits are thick, short and roughly hairy.

The upripe mucilaginous fruits form a well known vegetable. They are also pickled, and the seeds and fruits are also eaten raw.

## IPOMOEA BATATAS Lam.

FAM.—Convolvulaceæ.

COM. NS. :—*E.* Sweet potato ; *G.* Sakaria ; *H.* Sakharkand ; *K.* Genasu ; *M.* Ratalu.

A native of America and possibly brought to India via the pacific islands. Cultivated as a garden crop all over the State, area occupied being about 14,000 acres. Two varieties are known ; the first and most common with red or purple tubers grown mostly in the Deccan and the second with white tubers grown near Belgaum and other districts of Karnatak. A third variety known as *Cluster sweet-potato,* has been introduced by the Department of Agriculture, from Ceylon, which has tubers in clusters near the surface.

Tubers are used as food by people. They are either used as a vegetable. The tubers are eaten raw or roasted. They are made into chips or dried and turned into flour.

## LACTUCA SATIVA Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Lettuce ; *K.* Hakkarike ; *M.* Salat ;

A herb with a based rosette of leaves, cultivated in gardens throughout the year. There are two distinct groups of varieties.—(1) Cabbage lettuce with broad, rounded, spreading leaves. (2) Cos lettuce with suberect, narrow leaves.

The leaves are used as salad.

## LAGENARIA LEUCANTHA Rusby.

FAM.—Cucurbitaceæ.

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COM. NS. :—*E.* Bottle-Gourd; *G.* Dudhi; *H.* Kaddu, Lauki; *K.* Halakumbala; *M.* Dudhya Bhopala.

A rambling procumbent plant grown throughout the year all over the State. There are two common varieties grown in the State. (1) Bottle shaped, (2) Indian club shaped. The fruit is used as a vegetable. A sweet dish called *Dudhia-Halva* is prepared from this fruit. The dried shells of ripe fruits are often used as vessels for holding fluids, and one sort of *Kadava dudhia* is used as float by fishermen, and by people learning swimming. A variety of this is specially grown for use as resonance boxes for stringed instruments like *Tambura*, *Sitar*, etc.

## LUFFA ACUTANGULA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Ridge-Gourd; *G.* Turia; *K.* Hirikai; *M.* Dodaka.

It is indigenous to India. It is grown in gardens and round the edges of other crops. In the State, it is grown on large scale only in two districts—Thana and Sholapur, area occupied being about 176 acres. The shape of the fruits varies ranging from a narrow elongate, club-shaped body with low ribs to an ovoid one with deep ribs. The fruit is used as vegetable. Some fruits are bitter in taste.

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*See*—Fibres, Oils.

## LUFFA AEGYPTIACA Mill.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Smooth Gourd; *G.* Turia; *K.* Tiprikayi; *M.* Ghosala.

Grown in gardens during the rains, and may often be seen trailing over bushes, roofs of huts and small *mandaps* near houses. In the State it is mainly grown in Ahmedabad (nearly 40 acres). The shape of the fruits varies from long club-shaped to an ovoid one not larger than hen's egg. The fruit is used as a vegetable. *Bhajias* are prepared from thin slices. The fibrous net work of the ripe fruit is used as a brush or sponge.

*See*—Fibres, Oils.

### LYOOPERSICON ESCULENTUM Mill.

FAM.—Solanaceæ.

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COM. NS. :—*E.* Tomato; *G.* Vilayati vagan; *H.* Gurbaigan; *K.* Chappar badnikai; *M.* Bel-Wanga, Tomato.

The plant comes probably from Peru in South America. It was brought to India in the seventeenth century. It is cultivated practically all over the State throughout the year. The area occupied is about 3,276 acres. The common varieties grown are—Bonny Best, Poona Local, Marglobe, Oxheart, Baltimore, Ponderosa and Peach-blow. The fruit is used as salad or vegetable. The juice of the fruit is extracted and preserved as a sauce or ketchup.

### MOMORDICA CHARANTIA Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Bitter-Gourd ; *G.* Karela ; *H.* Karela ; *K.* Hagalkai ; *M.* Karle.

It is grown either as a rainy season crop or in garden lands at anytime of the year. In the State, it is mostly cultivated in the Thana district; it occupies about 42 acres out of 51 acres in the whole of the State. The fruit is used as a vegetable but requires steeping in salt-water before use.

*See*—Medicinal Plants.

### MOMORDICA DIOICA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Kamkola, Kartola ; *K.* Kartikai ; *M.* Kartoli.

It is grown in the Deccan during rainy season. The fruit is used as vegetable.

*See*—Medicinal Plants.

### MORINGA OLEIFERA Lam.

FAM.—Moringaceæ.

COM. NS. :—*E.* Drumstick Tree, Horse Radish Tree ; *G.* Sekto, Surgavo ; *H.* Sanjna, Sajna ; *K.* Nuggi Mara ; *M.* Shevga.

It is cultivated largely throughout the whole of India and is said to be wild in the Sub-Himalayan forests. It is found growing in gardens and near villages in all the districts of the State.

The flowers and leaves are eaten as a vegetable and the unripe pods are a favourite ingredient in curries. The root is sometimes used in European cookery as a substitute for horse-radish.

*See*—Medicinal Plants, Fibres, Timbers, Oils, Gums and Resins.

### PASTINACA SATIVA Linn.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Parsnip.

A hardy biennial; a native of Britain and Siberia. Cultivated sparingly in gardens in the State. Roots are used as vegetable mostly by Europeans.

### PETROSELINUM HORTENSE Hoff.

FAM.—Umbelliferеæ.

COM. NS. :—*E.* Parsley.

This is a native of Sardinia. Sparingly cultivated in the gardens in the State. Leaves are in great demand, especially amongst Europeans, for seasoning and garnishing purposes in numerous culinary preparations.

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### PEUCEDANUM GRAVEOLENS Benth.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Surva ; *H.* Sowa ; *M.* Shepu.

Shepu is grown in garden lands usually in cold season. The leaves are used as vegetable.

*See*—Medicinal Plants, Condiments and Spices.

### PHASEOLUS LUNATUS Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Double Bean, Lima Bean ; *G.* Double beej ; *K.* Awarikai ; *M.* Double-bee

It is a native of South America and has been introduced in this country about 1900. Cultivated throughout the State. The plant is biennial. The seeds are used as vegetable.

## PHASEOLUS VULGARIS Linn.

FAM.—Papilionaceæ.

SECTION 6.
Food Plants.
Vegetables.

COM. NS. :—*E.* French or kidney beans ; *G.* Phanasi ; *K.* Tingalavari ; *M.* Shravan-ghevada, Pharasbee.

It is a native of Latin America. Cultivated throughout the year in the gardens. In the State it occupies about 125 acres. There are two varieties, one has tough pods and the other smooth pods. The green pods are used as vegetable.

## PISUM SATIVUM Linn. var. arvense Poir.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Field Pea ; *G.* Vatana ; *H.* Mattar ; *K.* Batagadle ; *M.* Vatana.

It is mainly a *rabi* crop when grown for pulse ; but for the pods it can be grown at any time of the year mostly during June-December, round about Poona and Nasik. There are several varieties. The distinction is according to the flower colour, size and colour of seeds.

The unripe pods are used as vegetable. The leaves and stalks are utilised as fodder.

## PORTULACA OLERACEA Linn.

FAM.—Porula caceæ.

COM. NS. :—*E.* Purselane ; *G.* Ghol ; *M.* Moti-ghol or Ghol-bhaji.

This is a succulent annual with wedge-shaped leaves. It is a very common weed in irrigated gardens and fields, throughout the State. Leaves are extensively used as a pot-herb or *bhaji*.

## PSOPHOCARPUS TETRAGONOLOBUS D. C.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Chavdhari Ghevda.

A twining herb with pods having four wings which are usually much crisped and toothed. Cultivated to a small extent in the gardens during the rainy season.

The pods are used as vegetable.

## RAPHANUS SATIVUS Linn.

FAM.—Cruciferæ.

SECTION 6.

Food Plants.

Vegetables.

COM. NS. :—*E*. Radish; *G*. Mula, Mura; *H*. Muli; *K*. Mulangi; *M*. Mula.

It has been introduced into India from Western Asia. It is grown all over in the State as a garden crop, throughout the year. The total area occupied is about 1,500 acres. The common variety is one with long and white roots, sometimes attaining great girth. The foreign varieties grown in the State are, one with red root and the other with white root. They are rather globose or fusiform in shape.

*var.* Caudatus Alef.—*G*. *M*. Mogari.

Generally grown in Gujarat. This has dark-red, very long pods.

The roots, leaves, and pods are all used as vegetables.

*See*—Medicinal Plants, Oils.

## RUMEX VESICARIUS Linn.

FAM.—Polygonaceæ.

COM. NS. :—*M*. Chuka.

An annual herb, cultivated in gardens. The leaves and tender stems which are acidic in taste are used as vegetable.

*See*—Medicinal Plants.

## SECHIUM EDULE, Sw.

FAM.—Cucurbitaceæ.

COM. NS. :—*E*. Cho-cho; *M*. Chow-chow.

A perennial robust creeper with leaves like those of cucumber; It has pear-shaped pale green or white, warty or wrinkled fruits 10-15 cm. long. A native of Tropical America. Grown very occasionally in the gardens in the State. The fruit is used as a vegetable. The tuberous starchy roots of the plant are relished by some as vegetable. In Mexico this is boiled and candied or sliced and fried for table use.

## SESBANIA GRANDIFLORA Pers.

FAM.—Papilionaceæ.

SECTION 6.
Food Plants.
Vegetables.

COM. NS. :—*G.* Agathio ; *H.* Agusta, Basna ; *K.* Agase ; *M.* Agasta, Hadga.

A soft-wooded tree with large white or reddish-flowers. Cultivated in many parts of India. Grown about temples and villages all over the State. The flowers and tender pods are occasionally used as vegetable.

*See*—Medicinal Plants, Timbers, Gums and Resins.

## SOLANUM MELONGENA Linn.

FAM.—Solanaceæ.

COM. NS. :—*E.* Brinjal, Egg-plant ; *G.* Vengan ; *H.* Baingan ; *K.* Badnikai ; *M.* Wange.

One of the most important vegetables in the State. It is grown all over the State throughout the year ; the area occupied by the crop is about 17,887 acres. The majority of the brinjals cultivated in the State belong to the *var.* esculenta, which has all its parts prickly. The popular varieties of the State are (1) Gujarat (large and round purple), (2) The Ravaya, (3) Krishna Kathi, (4) Dorli, (5) Goti and (6) Surti-Gota.

The fruit is used as vegetable. When thin slices of the fruit are spiced and fried ; they form a very good dish.

*See*—Medicinal Plants.

## SOLANUM TUBEROSUM Linn.

COM. NS. :—*E.* Potato ; *G.* Batata ; *H.* Aloo ; *K.* Urulagodde ; *M.* Batata.

It is believed to be a native of South America. Introduced into Europe from America in the sixteenth century and later into India. It is widely cultivated in India. The crop is grown all over in the State, and to a small extent in Konkan and N. Kanara. The total area occupied is about 12,000 acres. It is grown as a *kharif* or as a *rabi* crop, in Khed taluka of the Poona district, which is one of the important potato growing centres. There are three common varieties of potato grown in the State. (1) Numbri, (2) Phool and (3) Italian. The first two are selections from the Simla types. The *numbri* is common in the Deccan while *Phool* is popular in Gujarat.

Tubers are generally used as vegetables. Many other spicy and sweet dishes are made from potatos.

## TRICHOSANTHES ANGUINA Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*E.* Snake-Gourd; *G.* Pandol; *H.* Chachinda; *K.* Padvalkayi; *M.* Padval.

Grown in gardens during the rainy season. In the State it is chiefly grown in Thana and Sholapur districts; area occupied is about 90 acres.

The fruits are used as vegetable.

## TRICHOSANTHES DIOICA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Parwar; *M.* Parwar.

It is a diœcious twining plant and the leaves resemble those of tondali (*Coocinia indica*). It is mostly grown along the edges of betel-leaf gardens in Gujarat. It is grown as a common vegetable in Northern India and Bengal. It has been introduced with great success in Palghar in Thana district. The fruit is small and green. There are two varieties—one with oblong fruit like tondali and the other with globular fruit. The fruits are highly valued as wholesome and nutritious vegetable. The tender tops are cooked as pot-herb. The young and unripe fruit is valued by Europeans next to potatoes and brinjals and is perhaps the vegetable in greatest favour with them.

## TRIGONELLA FOENUM-GRÆCUM Linn.

FAM.—Leguminosæ.

COM. NS. :—*E.* Fenugreek; *G.* Methi; *H.* Methi; *K.* Menthia; *M.* Methi.

It is grown in garden lands all over throughout the year. In the State, it is grown largely in Nasik and Khandesh districts. This crop is cultivated on a very large scale. The leaves and tender shoots are used as vegetable.

*See*—Medicinal Plants, Dyes and Tans, Condiments and Spices.

## VIGNA CATJANG Walp.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Chola; *H.* Lobia; *K.* Alsandi; *M.* Chavli.

It is grown as a *kharif* crop and also after rice in the *rabi* season. It is grown all over the State. The area occupied is about 85,618 acres. In the State nine varieties have been listed in respect to pod length and the colour of the seeds. The green pods are used as vegetable. They are eaten raw or cooked; stalks and leaves are a good fodder for milch cattle.

## FOOD PLANTS.

## (CEREALS)

### ANDROPOGON SORGHUM Brot.

FAM.—Gramineæ.

**SECTION 6.**
**Food Plants.**
Cereals.

COM. NS. :—*E.* Great millet; *G.* Juwar; *H.* Jaur; *K.* Jola; *M.* Jondhala.

Extensively grown cereal crop of the State, occupying about 9,182,948 acres of land. Sholapur, Ahmednagar and Bijapur districts account for nearly 45 % of the total area.

There are over 100 varieties of Jowar grown in the State during the two seasons—*kharif* and *rabi.*

The grain is chiefly used for bread after grinding into meal and forms the most important article of diet over the large part of the State. It is also eaten in popped form called *lahis.* Special dishes are also made from parched grains with salt, gul and chillies. The unripe tender cobs called *hurda* rare parched and the tender grains eaten with relish by people. Straw is used as cattle fodder.

*See*—Fodder Plants.

### AVENA SATIVA Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Oats; *M.* Jav.

This is a *rabi* crop grown occasionally in Poona, Ahmednagar, Satara and Ahmedabad districts.

Grains are ground into meal and cakes are prepared. Whole grains are boiled in milk or water and porridge is prepared. It is a wholesome food and is said to give tone to the nervous system.

### ECHINOCHLOA STAGNANA Beard.

### PANICUM CRUS-GALLI Linn.

FAM.—Gramineæ.

COM. NS. :—*G.* .Banti; *M.* Banti, Barti.

The millet is taken as a rain crop in the State, occupying about 32,494 acres. Chief centres of this crop are Ahmedabad and Panch Mahals in Gujarat and West Khandesh. Elsewhere it is grown in small patches.

The grain is much relished by the poor. It is usually boiled and eaten like rice. It is said to be most wholesome.

## ELEUSINE CORACANA Gærtn.

FAM.—Gramineæ.

**SECTION 6.**

**Food Plants.**

**Cereals.**

COM. NS. :—*G.* Bavto ; *H.* Ragi ; *K.* Ragi ; *M.* Nachani, Nagli.

It is entirely a kharif crop, occupying about 4,68,403 acres of land. The chief centres are Ratnagiri and Nasik districts.

Ripe grain is used for preparing bread. Flour is made into a cooling drink called *ambil.* Green heads are parched and eaten as *hurda.* Nachani is said to be very nutritious. The straw is used as fodder after powdering and mixing with *bhusa.*

*See*—Medicinal Plants.

## ORYZA SATIVA Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Rice ; *G.* Dangar ; *H.* Dhan ; *K.* Bhâttâ, Akki ; *M.* Bhât.

Rice stands third among the food crops of the State. It is chiefly cultivated in the Konkan and the heavy rainfall tracts of the Deccan (called Mawal) and Karnatak (called Malnad) along and close to the Western Ghats. A fairly large area is also cultivated in Gujarat. The total area is 21,98,486 acres.

A large number of varieties, some scented and fine and some non-scented and coarse, are grown in different tracts of the state. The Department of Agriculture of the State, is carrying on scientific research work on rice at twelve rice-breeding stations located in different districts of the State, and has so far evolved nearly thirty new rice strains suitable for different localities.

Boiled rice is the most common article of food of the middle and upper classes. The poor people use rice on feast days only. It is served to children and invalids in the form of *kanji.* The grain is also eaten in the form of *pohas* (flat lozenge shaped grains) or *murmuras* (puffed and swollen grains) and *lahias.* Various preparations are made from rice.

A kind of beer is also made from rice.

Rice straw is used as fodder for cattle in the Konkan and as cover for huts.

*See*—Medicinal Plants.

### PANICUM MILLACEUM Linn.

FAM.—Gramineæ.

**SECTION 6.**

**Food Plants.**

**Cereals.**

COM. NS. :—*G.* Cheno ; *H.* Barri ; *K.* Baragu ; *M.* Vari.

A millet grown entirely as *kharif* crop on hill slopes, in Konkan, and ghats of Nasik, Poona, Satara, Belgaum and Dharwar districts. The dehusked grain is cooked like rice and is sometimes ground into flour and made into bread. It is generally eaten by the poorer classes but is also used by middle and rich classes on fast days.

### PANICUM MILIARE Lam.

FAM.—Gramineæ.

COM. NS. :—*G.* Gadro, Kuri ; *H.* Shavan ; *K.* Save ; *M.* Halvi Vari, Sava.

This millet is grown in light red soils on hill sides in Konkan and ghats of Nasik, Poona, Satara, Belgaum and Dharwar. The husked grain is cooked like rice and sometimes ground into flour and made into bread ; used by poorer classes.

*N. B.*—The area under cultivation of the above two millets, is about 1,40,000 acres in the whole of the State.

### PANICUM PILOSUM Dals and Gibs.

FAM.—Gramineæ.

COM. NS. :—*M.* Bhadli.

It is a *kharif* crop cultivated in hilly areas on light soils. The area under cultivation is about 13,220 acres. Mostly grown in the Deccan and Gujarat.

The grains are much like red *Rala* and are sometimes confounded with it. The grain is husked and then boiled and eaten whole. Sometimes it is ground into flour for making bread. It is a poor man's food. The crop provides good fodder.

*See*—Fodder Plants.

### PASPALUM SCROBICULATUM Linn.

FAM.—Gramineæ.

COM. NS. :—*G.* Kodra ; *H.* Kodra ; *K.* Haraka ; *M.* Kodra.

It is a *kharif* crop. The most important centre of cultivation is in Gujarat, in goradu and alluvial soils. In the Deccan and in the Konkan ghats it is grown on very poor soils. The total area being 1,94,111 acres in the State.

The newly harvested grain is said to be powerfully narcotic and is eaten only by the poor who prepare it in various ways.

*See*—Poisonous Plants.

### PENNISETUM SPICETUM Rœm & Schult.

### (PENNISETUM TYPHOIDES Stapf.)

FAM.—Gramineæ.

COM. NS. :—*E.* Bulrush millet; *G.* Bajra, Bajri; *H.* Bajra; *K.* Sajje; *M.* Bajri.

It is mostly a *kharif* crop and is grown on light types of soil. It stands second to Jowar in importance as a food crop, and is mostly confined to Gujarat and Deccan. In Karnatak its cultivation is not to any appreciable extent; the total area being 47,72,822 acres in the State. There are about six varieties grown in the State.

The green ears of *Bajri* are parched (called *limbur* or *nimbur*) and eaten. The ripe grains are sometimes parched and made into *lahis.* Bajri is chiefly used for preparing bread (*bhakari*). In Gujarat the grain is also used as cattle feed for milch cattle and the straw is used as fodder.

*See*—Fodder Plants.

### SETARIA ITALICA Beauv.

FAM.—Gramineæ.

COM. NS. :—*E.* Italian Millet; *G.* Kang; *N.* Kangoone; *K.* Navane; *M.* Rala.

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Grown in Karnatak, Deccan, Konkan and Gujarat. The total area under cultivation is about 1,64,248 acres, out of which nearly 94% is in Karnatak. There are two varieties namely *red* and *white.*

The husked grain is usually boiled and eaten whole. Straw is used as fodder.

*See*—Fodder Plants.

### TRITICUM SPECIES.

FAM.—Gramineæ.

COM. NS. :—*E.* Wheat; *G.* Ghaha; *H.* Gehhun; *K.* Godhi; *M.* Gahu.

This is the fourth important cereal crop of the State and occupies 16,70,640 acres of land. It is cultivated as a rabi crop all over the State.

**SECTION 6.**

**Food Plants.**

Cereals.

There are three different species of cultivated wheat in this state—(1) *Triticum durum*, (2) *T. dicoccum* and (3) *T. vulgare*. Under each of these, there are different types. About 90% of the area under this crop in the State, grows durum types, about 8% vulgare types and 2% dicoccum types.

Wheat is classified into two major divisions, viz. *soft* and *hard* which are further divided into two sub-divisions *white* and *red*. The Department of Agriculture of the State, have evolved five strains of wheat suitable for different tracts.

As an article of diet, wheat is consumed all over the world; it is rich in nutritive value and is easily digestible. Grain is ground into flour and is used for preparing *chapatis*, bread, pastry, biscuits, sweetmeats, etc. Green nearly ripe earheads called "*Ombya*" are parched and eaten. Wheat bran (*bhusa*) is used as cattle feed.

## ZEA MAYS Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Maize; *G.* Makai; *H.* Bhuta, Makai; *K.* Goinjol, Makkejola; *M.* Maka.

Owing to its less adaptability to varying climates and soils its cultivation is localised in the State. It is extensively cultivated in the Panch Mahal district of Gujarat, where it occupies nearly 65% of the total area, which is 1,95,325 acres distributed all over the State. There are about five varieties grown so far. The Department of Agriculture of the State, has undertaken botanical improvement of this crop, with respect to higher yields.

Maize grain is nutritious. In the State it is rarely used in the form of flour for making breads, etc. The unripe tender ear-heads (cobs) are most commonly eaten being roasted and served with ghee and salt; in this form it is nutritious and very delicious.

When ripe, the large, shiny hard grains are ground into flour, from which corn-flour and various other articles of food are prepared. Maize is also used in the manufacture of starch for sizing and other purposes.

The straw is an excellent fodder.

*See*—Fodder Plants.

## PULSES.

### CAJANUS CAJAN Milsp. var. flava.

FAM.—Pipilionaceæ.

COM. NS. :—*E.* Pigeon Pea ; *G.* Tuvar ; *H.* Tur, Arhar ; *K.* Togari ; *M.* Tur.

**SECTION 6.**

**Food Plants.**

Pulses.

Tur is grown all over the State except Konkan where the area under this crop is negligible ; the total area under this crop is 4,48,890 acres.

It is a *kharif* crop and generally grown subordinate to or mixed with other crops.

There are two varieties—One with white seeds cultivated in Gujarat and the other with red or light brown seeds, grown in the Deccan and Karnatak.

The Department of Agriculture, of the State, has evolved a strain, Tur 84. It is late and yields 12% more than the local ones.

The green pods are eaten as vegetable. The ripe pulse is split (*dal*) and eaten boiled in curries and also mixed with vegetables. The outer husk of the seed with part of the grain is sold as *Chuni* and is a favourite food for milch cattle. Leaves are also used as fodder. The stalks are used for making brooms, baskets and for vaulting house walls and roofs.

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*See*—Fodder Plants.

### CICER ARIETINUM Linn.

*FAM.*—Papilionaceæ.

COM. NS. :—*E.* Gram, Chick-Pea ; *G.* Chana ; *H.* Chola, Chona , *K.* Chana, Kadale ; *M.* Harbara.

It is generally grown as a *rabi* crop everywhere in the State except Konkan where it is grown to a very small extent. The total area under the crop is 7,18,436 acres. Extensively cultivated all over India. It is one of the oldest pulses known and has been cultivated from ancient times both in Asia and Europe.

There are four varieties based on seed colour—(1) Black, (2) Red, (3) Yellow, (4) White. The last one commands a higher price.

The Department of Agriculture, Bombay State, has evolved three new strains of grain. *Chafa*, *early Gulab*, and *Dohad yellow*.

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Pulses.

Both the foliage and green grains are used as vegetables. The seed is eaten green, boiled or parched. Ripe seeds are split into *dal* and used in the preparation of many types of dishes. Gram is a good food for horses. A secretion from hairs on the leaves called *Amb* is collected in the fields from the plant during early hours of the morning. It is a mixture of citric and malic acids. This is used medicinally. Green plants are good fodder for cattle and horses.

*See*—Medicinal Plants, Vegetables.

## CYAMOPSIS TETRAGONALOBA D. C.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Cluster-bean ; *G.* Guvar ; *H.* Gasara ; *K.* Chavalikai, Guvar kai ; *M.* Guvar.

In the State, guvar is cultivated for two purposes—as a vegetable and as a pulse chiefly for cattle and horses. As a pulse crop it is only grown in Gujarat, Satara and Belgaum districts, the area being 28,033 acres.

There are four varieties cultivated in the State, (1) Pareshi, (2) Deshi, (3) Makhania and (4) Sotya guvar; the last one is grown in Gujarat only.

Guvar is mainly used as a pulse and as a green vegetable. It is a valuable cattle feed both in the form of grains and green matter. The crop is also used for green manure. It increases the nitrogen content of the soil.

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*See*—Vegetable, Fodder Plants.

## DOLICHOS BIFLORUS Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Horse-gram ; *G.* Kulthi ; *H.* Kulthi ; *K.* Huruli ; *M.* Kulith, Hulga.

Kulthi is grown as a *kharif* crop chiefly in the Deccan, Karnatak and Ratnagiri districts, occupying nearly 95% of the total acreage of 5,53,983 acres in the whole State.

There are four varieties differentiated according to the seed colour—as *brown, light-red, black* and *mottled.*

The pulse is eaten in soup and porriage. It is given to horses after boiling. The green crop is a good feed for cattle and sheep.

*See*—Medicinal Plants, Oils, Fodder Plants.

SECTION 6.
Food Plants.
Pulses.

## DOLICHOS LABLAB Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Wal ; *H.* Ballar ; *K.* Avare ; *M.* Wal.

It is mainly a *rabi* crop in the State and is a second crop in rich fields. It is cultivated all over the State, the total area occupied being about 1,04,887 acres. It is also found wild in India.

There are seven varieties of *Wal* grown in the State. (1) Bandwal, (2) Kathivadi Ghevda, (3) Lalgunj, (4) Valpapadi, (5) Kadva, (6) Ghevada and (7) Pavata.

The pulse is eaten whole or split cooked in various ways. The husk, broken bits of *dal*, leaves and stalks form a good feed for milch cattle.

*See*—Vegetables, Fodder Plants.

## LATHYRUS SATIVUS Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Chickling Vetch ; *G.* Lang ; *H.* Khesari ; *M.* Lakh.

It is a *rabi* crop grown extensively in Broach and Surat districts of Gujarat, occupying about 95% of the total area of 60,041 acres in the State ; also grown in Nasik district.

The pulse is generally used split and is considered inferior to other pulses. Excessive use is believed to cause a type of paralysis known as Lathyrism. The matter is still under investigation. The plants are used as fodder for work cattle and are supposed to be very nutritious.

*See*—Medicinal Plants, Fodder Plants, Poisonous Plants.

## LENS ESCULENTA Mœnch.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Lentil ; *G.* Masur ; *H.* Masur ; *K.* Channangi ; *M.* Masur.

This is grown as a *rabi* crop. It is chiefly grown in the Nasik and Belgaum districts occupying about 90% of the total area of 8,506 acres in the State. It is native of Western Asia, Greece and

Italy, but has long been cultivated in Egypt and from there was introduced into India.

The green pods are sometimes eaten as vegetable. When ripe the pulse is eaten whole or split cooked in many ways in curries or mixed with other vegetables.

*See*—Medicinal Plants.

### PHASEOLUS ACONITIFOLIUS Jacq.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Math ; *H.* Matki ; *K.* Madike ; *M.* Matki.

It is a *kharif* crop grown all over the State except Konkan, the area occupied being 3,44,307 acres. The Agricultural Department, of the State, has evolved four high yielding strains which are being tried in the Satara district.

It is eaten whole either parched or boiled with condiments and is used in curries. It is used as a split pulse and also ground to flour and is mixed with other flours. It forms a fattening diet to horses and cattle. The stalks and leaves are also used as fodder for cattle.

### PHASEOLUS MUNGO Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Adad ; *H.* Urid ; *K.* Uddu ; *M.* Udid.

It is both a *kharif* and *rabi* crop. It is grown all over the State, the area occupied being about 4,43,286 acres. The green pods are used as vegetable. The ripe pulse is split and consumed as dal. The dal is ground to flour and made into *papads*. The flour is also made into *vadas* mixed with rice flour, salt, chili powder and fried in sweet oil. The stalks and leaves are a good fodder for cattle.

*See*—Medicinal Plants, Fodder Plants.

### PHASEOLUS RADIATUS Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Green Gram ; *G.* Mag. ; *H.* Mug ; *K.* Hesaru. *M.* Mug.

It is both *kharif* and *rabi* crop and is grown mixed with cereals. It is cultivated all over the State but mostly in Maharashtra and in the Bijapur and Dharwar districts of Karnatak. The total area occupied is 2,78,593 acres.

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Pulses.

There is a new variety recently introduced called China mug, which has a bigger sized grain than the local one. The green pods are used as vegetable. The ripe green coloured grain is consumed whole or split in curries, etc. There is also a small seeded yellow coloured variety called "Sonmug" which is more tasty and fetches a higher price. The grains are parched and ground, mixed with ghee and sugar and made into balls (*ladus*). The leaves and stalks are very good fodder. The *mug* flour is sometimes used as a substitute for soap or soap-powder. The crop is also used as a green manure.

## PISUM ARVENSE Linn.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Pea ; *G.* Vatana ; *H.* Matar ; *K.* Batagodle ; *M.* Vatana.

It is mainly a *rabi* crop when grown as a pulse. It is a *kharif* crop when grown for pods. It is grown all over but mostly in the Deccan and Gujarat, occupying about 25,373 acres in the State.

There are several varieties classified according to flower-colour, size and colour of the seeds, etc.

The pea is mostly grown for its pods which are used as vegetable when unripe. The pulse is used split or whole, cooked in different ways. The leaves and stalks are used as fodder.

*See*—Fodder Plants.

## VIGNA CATJANG Walp.

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FAM.—Papilionaceæ.

COM. NS. :—*E.* Cow Pea ; *G.* Chola ; *H.* Lobia ; *K.* Alsandi ; *M.* Chavli.

Chavali is generally grown as a *kharif* crop either alone or in combination with millets. It is also grown as a *rabi* crop after rice. It is grown all over the State, the total area occupied being about 85,618 acres.

There are nine varieties classified in respect to the length of the pod and colour of seeds. A large variety called *dang chavli* is usually grown round the edge of other crops.

The green pods are used as vegetable. They are eaten raw or cooked. The pulse is eaten cooked in various ways. The green stalks and leaves are a good fodder for milch cattle.

It is also grown as a green manure crop.

*See*—Vegetables, Fodder Plants.

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## SECTION 7—FRUIT TREES (Cultivated).

**SECTION 7.**

**Fruit Trees.**
(Cultivated)

### ACHRAS SAPOTA Linn.

FAM.—Sapotaceæ.

COM. NS. :—*E.* Sopodilla-plum ; *G.* Chiku ; *K.* Chiku hannu ; *M.* Chiku.

A small tree ; a native of Tropical America (especially Mexico). Cultivated in orchards throughout the Bombay State, but thriving best near the sea. Best commercial plantations are at Dahanu and Gholwad in the Thana district. Area occupied is about 2,300 acres. The tree fruits throughout the year. The Chiku is variable in form and is round, oval or conical in shape. The ripe fruit is soft, sweet, delicious and much relished as a table fruit. In the U. S. A. the white latex from the fruit is used to prepare chewing-gum, largely eaten in that country.

*See*—Timbers, Gums and Resins, Dyes and Tans.

### ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cashew Nut ; *G.* Kaju ; *K.* Kaju ; *H.* Kaju ; *M.* Kaju.

A fairly large tree. It is a native of West Indies and South America. It was introduced into India by the Portuguese. It requires a coastal climate and is largely cultivated in the Ratnagiri and N. Kanara districts of the Bombay State occupying about 3,500 acres. It is rarely seen in the inland districts and then only in gardens. The tree flowers twice in a year—April and December. The so called fruit is the thick fleshy peduncle. It is red or yellow in colour and is sweet, sour or astringent in taste. It is edible. The fruit have an acrid pericarp and contain one seed each. They are roasted and the seeds taken out. They are eaten roasted and are used in the preparation of sweet-meats. An intoxicating drink is prepared from the ripe peduncles in Goa. Cashew nut is a very important export crop today, worth crores of rupees.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

### ANANAS SATIVUS Schult.

FAM.—Bromeliaceæ.

COM. NS. :—E. Pine Apple ; *G.* Ananas ; *H.* Ananas ; *K.* Ananas hannu ; *M.* Ananas.

It is a herbaceous perennial. It was introduced in India from South-America—its home. It is now grown along the coastal regions in

Goa, Sawantwadi, Ratnagiri, Kolaba, Thana districts and Amalsad in Gujarat.

It is rarely grown as a sole crop. There are three varieties in cultivation: (1) Local—called Mauritius—is small, less juicy but sweet. (2) Queen and (3) Giant Kew. The last two are recent introductions. The Kew variety is the best having juicy, sweet and very large sized fruit. The fruit is very useful as a table fruit and is widely used for canning and *jam-making*.

*See*—Medicinal Plants, Fibres.

## ANONA CHERIMOLYIYA Mill.

FAM.—Anonaceæ.

COM. NS. :—*M*. Marutiphal; *K*. Hanamphala.

A small tree; It is a native of Equador and Peru. In India it is grown in the Nilgiri Hills. It was introduced from the Nilgiris into the Ganeshkhind Botanical Gardens in 1904. There are some trees growing in those Gardens at present. The fruit is large, green, round, oblong or heart-shaped with pitted rind. It is very delicious. It much resembles Ramphal (Bullock's Heart) but is a bit superior to it.

## ANONA MURICATA.

FAM.—Anonaceæ.

COM. NS. :—*E*. Soursop; *M*. Mamphal.

A small shrubby tree; a native of West Indies. It is occasionally grown in large gardens. The fruit varies in form from kidney-shaped to ovoid and is covered with soft green prickles. The white-woolly pulp is sweet-acid and juicy.

## ANONA RETICULATA Linn.

FAM.—Anonaceæ.

COM. NS. :—*E*. Bullock's heart; *G*. Ramphal; *K*. Ramphal; *M*. Ramphal.

A small tree. It is very rarely cultivated as a special crop in the Bombay State. It hardly occupies 50 acres all of which lies in the Poona district. Occasional trees are grown here and there in the State in gardens or near the houses. The fruit is 10-15 cm. in diameter, almost heart-shaped (hence the name Bullock-heart) and yellowish-red with a muddy tinge when ripe. The pulp is white having the consistency of soft butter and is rather acidic. The fruit is locally consumed.

*See*—Fibres, Dyes and Tans.

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## ANONA SQUAMOSA Linn.

FAM.—Anonaceæ.

COM. NS. :—*E.* Custard Apple, Sweet-sop; *G.* Anuram, Sitaphal; *H.* Sitaphal, Sharipha; *K.* Amritphal, Sitaphal; *M.* Sitaphal.

Native of Tropical America; introduced into India; a small tree largely cultivated in gardens; domesticated and wild in the forests and other places throughout the Bombay State. There are about 120 acres of regular plantations in the State. There are three varieties; green, which is most common and popular and is the best, yellow and the red. The green variety yields more and hence it is grown commercially. The fruit is exclusively consumed locally. The white pulp having the consistency of soft butter is used to flavour ice-puddings.

Seeds contain an insecticidal principle.

*See*—Medicinal Plants.

## ARECA CATECHU Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Areca Nut Palm; *G.* Hopari, Sopari; *H.* Supiyari; *K.* Adki; *M.* Pophal, Supari.

A tall tree cultivated in Konkan and Sirsi and Siddapur talukas of North Kanara. It occupies an area of about 20,000 acres in the Bombay State. There are practically no varieties, but the *Rotha* from Shrivardhan is considered the best and it fetches good price in the market. The seed is mainly used as a masticatory together with betel leaf. The seed contains tannic acid, fat and three alkaloids—arecidine, guvacine and arecolodine.

*See*—Medicinal Plants, Fibres.

## ARTOCARPUS COMMUNIS Forst.

FAM.—Moraceæ.

COM. NS. :—*E.* Bread Fruit; *M.* Bhajicha Phanas, Bhakariche Zad.

A handsome tree with large polished green leaves. It is a native of South Sea Islands, Mulacca and Java. The fruit is oval of the size of a large cocoa-nut and resembles the jack fruit (Phanas). It is occasionally cultivated in large private gardens in Konkan and

Karwar. There are two varieties. One with seed and the other seedless. The fruits are either used as vegetable or bread is prepared from the roasted pulp of the fruit; the seeds are also roasted and eaten. They are sweet. The bread-fruit forms an important article of diet with the native of the South Sea Islands.

*See*—Timbers, Gums and Resins.

### ARTOCARPUS INTEGRA Thumb.

FAM.—Moraceæ.

COM. NS. :—*E.* Jack Fruit Tree ; *G.* Vanas ; *H.* Chakki ; *K.* Halasu ; *M.* Phanas.

A large evergreen tree, widely cultivated; planted near villages in the State and also grown in gardens; often planted along roadside in N. Kanara; found wild in rain forests of Western Ghats, Konkan. It occupies an area of about 2,000 acres in the Bombay State, most of which is found in the Ratnagiri and Kanara districts. There are two varieties of this fruit, *Barka*—pericarp is easily opened with soft pulp succulent bracts and is eaten when fresh. *Kapa*—pericarp is hard to open with firm pulp and keeps longer. The fruit is used as a vegetable when green. When ripe, pulp is eaten. Seeds when roasted are very palatable and nutritious. The soft pulp from the *Barka* variety is much used for preparing *Phanaspoli* dried juice. *Papads* are also prepared from the pulp mixed with salt and chili-powder. Pulp mixed with granular rice flour and sugar is made into cakes called *Sandana.* This is very delicious and is a famous dish in Konkan.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gum and Resins, Fodder Plants, Famine Plants.

### AVERRHOA BILIMBI Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*H.* Anvalla, Bhimbu ; *M.* Bilimbi, Bimbal.

A small tree, sparingly grown in gardens in Konkan (Ratnagiri) and N. Kanara. The fruit resembles large *tondali* fruit, but has faint ridges; they are borne in clusters on the tree. They are sour and are used only for preparing pickles.

*See*—Timbers.

## AVERRHOA CARAMBOLA Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*E.* Carambola Apple, Coromondal gooseberry; *G.* Kamrang; *K.* Kirahulli; *M.* Kamarakh.

A small tree grown in gardens throughout the State. It thrives well in Konkan, runs wild in some of the forests near villages in North Kanara.

The fruit is remarkably handsome of the size of a lemon, deeply ribbed, when perfectly ripe semi-transparent and of a fine rich amber colour. When well ripened, it has a strong and agreeable odour, as well as a very fine and peculiar flavour. It is acidic and unfit to be eaten raw. It does not bear cooking well as it then becomes tough and horny. The pulp affords a very delicious jelly. It is also pickled.

*See*—Medicinal Plants, Timbers.

## BORASSUS FLABELLIFER Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Palmyra Palm; *G.* Tad; *H.* Tad; *K.* Talemara; *M.* Tad.

A large erect palm. Cultivated and self sown in the coastal districts of the State; very common in coastal regions north of Ratnagiri, Thana and Kolaba districts. The unripe seeds called ***Tad-gola*** are eaten during the hot weather. They are cooling. The inflorescence is tapped for toddy which is fermented and used as liquor. Gul is also manufactured from the toddy.

*See*—Medicinal Plants, Timbers, Fibres, Gums and Resins, Famine Plants.

## CARICA PAPAYA Linn.

FAM.—Caricaceæ.

COM. NS. :—*E.* Papaw; *G.* Papai; *H.* Papita; *K.* Pangi, Peragi; *M.* Popayi.

A small tree. Native of Tropical America. Cultivated all over in the Bombay State. The crop is cultivated on a commercial scale in the districts of Ahmedabad, Kaira, Ahmednagar, East Khandesh, Nasik and Poona. The area occupied is about 2,000 acres. There are no established varieties of Papaya. A variety known as Washinton has been introduced and has become very popular and is widely cultivated. Ripe Papaya fruit has a sweetish taste and a peculiar fine flavour and is eaten with great relish. The green fruit is mixed with meat when cooking to make the meat tender. The fruit has got digestive properties. Vegetable pepsin is manufactured from the white juice gathered from incisions made on the fruit. Semi-ripe fruits contain large amount of pectine which is used in the preparation of jelly.

*See*—Medicinal Plants, Fibres, Gums and Resins.

### CHRYSOPHYLLUM CAINITO.

FAM.—Sapotaceæ.

COM. NS.—*E.* Star-apple ; *M.* Taraphal.

A medium sized handsome evergreen tree. Native of Tropical America and West Indies. The trees are planted as roadside trees in the Fort area of the Bombay City. They are also planted in gardens in Poona. The fruit is slightly larger than a Chiku fruit and when cut open shows 8 to 10 compartments arranged like a star (hence the name star-apple). It contains small amount of sugar and is not much relished. In Tropical America, the fruit is much relished by the people.

### CICCA ACIDA Merr.

FAM.—Euphorbiaceæ.

COM. NS.—*E.* Country gooseberry ; *G.* Amla ; *H.* Harparauri ; *K.* Kirnelli ; Rayaranelli ; *M.* Haraparrevadi, Rai-amba.

A small tree. Cultivated in gardens in the State. It bears fruits twice a year—once in April-May and again at the end of rains. The fruit is extremely sour and is usually eaten cooked with sugar. It is also made into pickle.

*See*—Medicinal Plants, Timbers, Dyes and Tans.

### CITRUS Group of fruits.

FAM.—Rutaceæ.

COM. NS.—*E.* Sweet orange, Mandarin orange ; *G.* Narayngi ; *H.* Narenji, Naringi ; *K.* Doddile, Sukkarekanji ; *M.* Santra, Naringa, Mosamba.

Largely cultivated in the Bombay State. There are two main types which are distinguished by the adherence of the skin to the pulp—(1) Santra group and (2) Mosambi group. In the Santra group the

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skin is quite loose and has a beautiful golden colour. In the Mosambi group the skin is tightly attached to the pulp.

SANTRA GROUP : (Loose skinned).—Under this there are four types, Santra, Ladoo, Kawla, Reshami Naring.

SANTRA : *Bot. Name* : *Citrus reticulata,* Blanes.

(*E.* Mandarin orange). Largely cultivated all over in the Bombay State; the crop is successfully cultivated on large scale in Poona, Ahmednagar, Sholapur and Khandesh districts. The total area occupied, in the State is about 3,500 acres. This is the most popular of all citrus fruits. It has a globose shape and beautiful golden colour. The flavour is agreeably sweet, yet acid. It is used as a dessert fruit, table fruit, and also for its delicious juice; also used for preparation of jams and marmalades.

LADOO : The type is occasionally grown in Santra gardens. The fruit has deep orange colour, has the shape of a top; the juice is sweet but flavour inferior to Santra.

KAWLA : *Bot. Name* :—*Citrus crenatifolia,* Lush.

This is a very inferior orange. The colour is attractive but the pulp is much inferior in quality. The fruit is characterised by a circular ring near the apex. This tree is rarely seen in orange gardens.

RESHMI NARING : The fruit of this is very small and worthless containing scanty juice and many seeds. It is rarely seen in gardens.

MOSAMBI GROUP (Tight Skinned) : Mosambi *Bot. name* :—*Citrus sinensis,* Swingle. *E.* Sweet orange. The origin of this variety is said to be in China. In the Bombay State, it is cultivated in many districts but it is particularly restricted to the districts of Ahmednagar, Poona and E. Khandesh in the Deccan. The total area occupied is about 20,000 acres out of which 96 % of the area falls in the above three districts. The flavour of the fruit is less piquant than that of Santra fruit and the colour of the pulp much lighter. There are two varieties of the fruit, one is thin-skinned called *Kagdi* and the other is thick-skinned called *Godhadi*. The former is the better. The fruit is relished as a dessert and table-fruit. The juice is very refreshing and highly nutritious. The Naval orange, the Malta Blood Orange and the Jamaica Orange are sometimes grown in gardens, but these types have not yet found their way into the practice of the ordinary cultivator.

*See*—Medicinal Plants, Oils, Gums and Resins.

### CITRUS GRANDIS (L.) Osbeak.

### (CITRUS DECUMANA Murr.)

FAM.—Rutaceæ.

COM. NS.—*E.* Pomelo ; *G.* Popnas ; *K.* Kanchikai ; *M.* Papnas.

A round headed bushy tree, a native of Malaya. It is grown on small scale. It occupies about 250 acres in the Bombay State, out of which nearly 220 acres are in the Satara district. There are two varieties, one with red or rose flesh and the other with white flesh. The former is very popular and sweeter than the latter. An intermediate variety with pink flesh is occasionally found. The fruit is eaten along with sugar or salt and is much relished.

### CITRUS MEDICA Linn.

FAM.—Rutaceæ.

COM. NS.—*E.* Citron ; *G.* Bijoru ; *H.* Turanj ; *K.* Madala ; *M.* Mahalunga.

A small tree. Cultivated in the Bombay State. There are no regular plantations but odd trees occur in gardens in many places ; said to be wild in Western Ghats. The fruit is large, skin warty and rough and the rind very thick. The pulp is bitter and acidic, pale-white in colour. The fruit is used for pickles and preserves.

*See*—Medicinal Plants.

### CITRUS AURANTIFOLIA Swingle.

### (CITRUS MEDICA var. acida)

FAM.—Rutaceæ.

COM. NS.—*E.* Sour lime ; *G.* Khatalimbu ; *H.* Lebu ; *K.* Limbe ; *M.* Kagdi Limbu.

A small tree ; cultivated throughout the Bombay State in gardens ; believed to be wild in Western Ghats ; the area occupied is about 2,000 acres. The fruit is small and round. It is used for making pickles, and the juice is used for adding taste to salads, etc. and for making drinks like *Sherbat.*

Three sub-varieties are found : (i) thick-skinned called *godhadi,* specially suited for making pickles ; (ii) thin-skinned called *kagdi* (true) ; (iii) long and thin-skinned fruit called *pat limbu* found specially in Sholapur district.

### CITRUS AURANTIFOLIA Swingle var. Limetta.

### (CITRUS MEDICA var. Limetta)

FAM.—Rutaceæ.

COM. NS.—*E.* Sweet Lime (true) ; *M.* Sakhar Limbu.

It is rarely cultivated in gardens. The fruit of this tree has a sweetish taste at all stages. The fruit is of little commercial importance.

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### CITRUS LIMON (L.) Burm. f.

### (CITRUS MEDICA var. Limonum.)

FAM.—Rutaceæ.

COM. NS.—*E.* Lemon ; *G.* Motalimbu ; *H.* Jambira ; *K.* Devamadala ; *M.* Idalimbu, Jamburi.

A small tree ; rarely grown for fruit ; The plant is used as a stock to bud oranges. The fruit is smaller than Mahalung, skin is thinner than that of Mahalung and is rather rough. The juice is very acid ; the fruits are sometimes used for making pickles.

*See*—Medicinal Plants, Oils.

### CITRUS PARADISI Macfadyen.

FAM.—Rutaceæ.

COM. NS.—*E.* Grape fruit.

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A small tree. Cultivated in Maharashtra and Gujarat. This is a new fruit believed to have been developed from a cross between the *Pomelo* and the *Mosambi.* The fruit resembles the Pomelo much in appearance but is smaller in size. The tree bears fruits in bunches like grapes and hence its name. The fruit has become quite popular amongst the Parsis, Europeons and aristocratic Hindus. The fruit is eaten with sugar and relished as a break-fast fruit. It contains Vitamin C and is supposed to increase appetite.

### CITRULLUS VULGARIS Sohrad.

FAM.—Cucurbitaceæ.

COM. NS.—*E.* Watermelon ; *G.* Tarbuja ; *H.* Tarbuja ; *K.* Kallangade ; *M.* Kalingad.

It is a creeper. It is found in wild state in W. Rajastan and equatorial Africa. In the Bombay State it is grown in many districts in sandy spots or in river beds. The area occupied is about 3,000 acres. The fruit is smooth and round, dark green and striped with light green. Fruits ripen during the hot weather. The flesh is pink to red in colour, very soft and watery. It is generally eaten raw. Water squeezed out from the flesh is taken as a cooling drink.

There are about 5 varieties.—

(1) PANDHRE TARBUJA grown in Sangamner and Dhulia. Fruit whitish outside, flesh deep or pale rosy red; best to eat.

(2) SAHEBI TARBUJA grown in Alibag and other parts of the Kolaba district. Fruit whitish outside, flesh red. Largely found in the Bombay Market. Keeps for a long time.

(3) KALE TARBUJA grown in Sangamner and Dhulia. Fruit dark-green outside, flesh deep rosy red; not very good to eat.

(4) SURAI grown in Sangamner. Fruit long, flesh red and seed reddish.

(5) KALAMI grown in Sangamner.
KABORA OR CHITRA grown in Dhulia.
} Fruit round, flesh rosy, seeds black with white lines.

*See*—Oils.

## COCOS MUCIFERA Linn.

FAM.—Palmæ.

COM. NS.—*E.* Coconut; *G.* Narial; *H.* Narial; *K.* Tengu; *M.* Naral.

A tall tree; indigenous to Islands of the Indian and Pacific Oceans. Cultivated extensively near the sea in the Bombay State. Common in Konkan and N. Kanara. It occupies about 24,735 acres. It is also grown now-a-days in inland parts in bunglow or house-gardens as a utility tree. The kernel of the nut (*Copra*) has mainly two uses. It is eaten raw and is used in many Indian dishes for improving their taste. It is also utilised for its oil, which has a commercial value. Pericarp of the fruit yields coir. Every part of the tree is useful in one way or other, hence it has been named by some as *Kalpavriksha.*

*See*—Medicinal Plants, Timbers, Fibres, Oils, Sacred Plants.

## COFFRA ARABICA Linn.

FAM.—Rubiaceæ.

COM. NS.—*E.* Coffee ; *M.* Bund.

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A small tree ; a native of Abyssinia. There are no regular plantations of this tree in the Bombay State. The tree is grown occasionally in Konkan, Belgaum and N. Kanara districts, and near Panchgani and Mahableshwar in hills. The berries contain 2 seeds each, they are roasted, ground into powder from which a beverage is prepared. It is a refreshing or stimulant drink.

## CUCUMIS MELO Linn.

FAM.—Cucurbitaceæ.

COM. NS.—*E.* Melon ; *M.* Kharbuja.

A creeping annual, supposed to be native of North-West India, and perhaps Central Asia. Cultivated in sandy beds of rivers during the dry season. The fruit is eaten.

VAR. *agrestis Naud* :—*K.* Puttihai ; *M.* Shendad, Takmak.

This is probably the wild variety of the melon. The plant is however cultivated in the Deccan and the fruits are largely sold in the market at the beginning of cold season. They are small, green ellipsoid and slightly hairy. They are not very tasty.

*See*—Medicinal Plants, Oils.

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## EMBLICA OFFICINALIS Gærtn.

FAM.—Euphorbiaceæ.

COM. NS.—*E.* Embelia myrobalan ; *G.* Amla ; *H.* Anola ; *K.* Nellikai ; *M.* Avla.

A small tree ; it is found in deciduous forests throughout the Bombay State ; often grown in gardens and kitchen gardens in Konkan, Deccan and Gujarat. There are two varieties. One with large fruits grown in Gujarat and the other with small fruits grown in the Deccan. The fruit is round, whitish green and acidic and astringent. It is used in pickles and preserves. The fruit is sometimes dried and used as a masticatory like *Supari.* It is very rich in Vitamine C.

*See*—Medicinal Plants, Timbers, Gums and Resins, Dyes and Tans, Fodder Plants, Sacred Plants.

## ERIOBOTRYA JAPONICA Lindl.

FAM.—Rosaceæ.

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COM. NS.—*E.* & *Chinese*—Loquat. *M.* Lokat.

A medium-sized evergreen and symmetrical tree with large handsome leaves. Native of South China and Japan. Occasionally found planted in gardens. The dingy white flowers are delightfully fragrant. The small pear-shaped, yellow fruits, have a sweetish acidic flavour and may be used for dessert, or for stewing though it has no importance as a fruit-tree in this State. It can be grown as an ornamental tree.

## EUGENIA MALACCENSIS Linn.

FAM.—Myrtaceæ.

COM. NS.—*E.* Malay Apple ; *M.* Malaka jamb.

A large tree. Native of Malaya. Often grown in gardens in Bombay State, where it thrives well. It produces dense racemes of large bright crimson flowers. The fruit is of the size of a small apple. The white pulp is eaten, although it is not very palatable.

## FERONIA LIMONIA (L) Swingle.

FAM.—Rutaceæ.

COM. NS.—*E.* Elephant or wood apple ; *G.* Kavit ; *H.* Kavith ; *K.* Byala, Manmadha ; *M.* Kavath.

The tree is common throughout the Bombay State, both in forests and grown in gardens. The fruit is round with a hard shell, of pale green colour and about the size of a cricket ball. It contains soft brown mealy pulp rather acid. When ripe, it is eaten with gul or sugar ; when green, it is made into *chutnees*. A very pleasant jelly which closely resembles black currant jelly is prepared from the pulp.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins, Fodder Plants, Sacred Plants.

## FICUS CARICA Linn.

FAM.—Moraceæ.

COM. NS.—*E.* Fig ; *G.* Anjir ; *H.* Anjir ; *K.* Anjuri ; *M.* Anjir.

A small tree ; West Asia is believed to be the native home of fig. In the Bombay State, it is largely grown only in Purandar taluka of the Poona district, where it occupies about 285 acres of the total area of about 500 acres in the State. Grown scattered elsewhere. The ripe fruit is delicious and is largely consumed in fresh form. Jam is also occasionally prepared from the figs.

*See*—Medicinal Plants.

### FRAGARIA VESCA Linn.

FAM.—Rosaceæ.

COM. NS.—*E.* Strawberry; *M.* Ishtapuri.

A small plant. Cultivated to a considerable extent at Mahabaleshwar where the fruits ripe from March up to the commencement of the rains in June. The fruit is red, globose or bluntly conical. It is one of the delicacies of the hills. It is eaten alone or mixed with cream and sugar.

### CREFIA ASTATICA Linn.

FAM.—Tiliaceæ.

COM. NS.—*G.* Phalsa; *H.* Phalsa; *M.* Phalsa.

A coarse shurb. Cultivated in gardens in the State but mostly so, near Surat in Gujarat; it is also found wild in jungles. The fruit is a berry about the size of a pea, with a stone in the centre. It ripens in hot weather. It is sour. The people in Gujarat like it most. They prepare *sherbat* from this fruit which is cooling.

*See*—Medicinal Plants, Timbers, Fibres.

### LITCHI CHINENSIS Sonn.

FAM.—Sapindaceæ.

COM. NS. :—*E.* & *Chinese*—Litchi.

A medium sized handsome tree, native of China. It has been occasionally cultivated in Bombay. It is rarely seen in Poona gardens. It produces sprays of pale green flowers. The fruit, borns in large clusters, is of the size and form of a plum with rough, thin, warty rind of dull brown colour when ripe. The jelly like pulp or aril which covers the seed is of a translucent whiteness and of an agreeable sweet acid flavour. The fruit is used as a dessert.

## MALPIGHIA PUNCCIFOLIA.

FAM.—Malpighiaceæ.

COM. NS.—*M.* Lal Bor.

A large shrub, native of Tropical America and West Indies, occasionally grown in the gardens in Poona. It flowers in June; the flowers are small and white. The fruit, which is red and of a size of a *bor,* is ready in July and August. It has sweet acid taste. Children are very fond of these fruits; a fine jelly can be prepared from this.

## MANGIFERA INDICA Linn.

FAM.—Anacardiaceæ.

COM. NS.—*E.* Mango; *G.* Ambo; *H.* Am; *K.* Mavu; *M.* Amba.

A large evergreen tree. Common everywhere; wild and cultivated; India can be regarded as the home of mango. In this State the area under mango is about 30,000 acres, while old trees occur in every village. The State has long been celebrated for the excellence of its mangoes. There are a number of varieties of mango. Mango has been cultivated in India for more than two thousand years. The number of varieties grown in the different parts of India is very large. No scientific basis for their classification has yet been found though various authors have classified the varieties grown in different parts of India according to their shape, size, colour, and other characters of the fruit. The Bombay varieties have been classified by Burns and Prayag in Bulletin No. 103 of 1920-21, Department of Agriculture, Bombay, in three groups, Long fruited, Round fruited and of Indefinite shape. The recently published monograph of mango published by the Indian Council of Agricultural Research does not develop any scientific classification of the varieties described. The main difficulty lies in the want of accurate descriptions of all the various parts of varieties known and the absence of authentic harbarium material of these.

The most popular grafted Bombay varieties are Alphonso and Pairi.

ALPHONSO (Aphus)—The fruit is of excellent quality, fibreless, possesses very delicious taste and nice aroma. It has the best keeping quality and is a very nice table-fruit.

PAIRI—This is the second best variety. The flavour and taste is delicious when ripe. It has poor keeping quality. A fairly good table-fruit.

COWASJEE PATEL—This is a cooking variety, insipid in taste. The pulp is firm and fibreless. It is much used for making preserves.

The green or unripe mangoes are used for making preserves, pickles and chutnees. The juice of ripe mangoes is also preserved in tins and exported. It is also utilized in preparing many sweet dishes. The juice is also dried in the sun to form "Sath".

*See*—Medicinal Plants, Timbers, Gums and Resins, Dyes and Tans, Fodder Plants, Sacred Plants.

### MIMUSOPS ELENGI Linn.

FAM.—Sapotaceæ.

COM. NS.—*G.* Borsalli; *H.* Bakul; *K.* Bakul, Kalhale; *M.* Bakul.

A large evergreen tree. Common in the evergreen forests of N. Kanara and the Konkan, often planted in gardens and near temples. The yellow, ovoid fruit of the size of a *bor* is sometimes eaten.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

### MIMUSOPS HEXANDRA Roxb.

FAM.—Sapotaceæ.

COM. NS.—*G.* Rayan; *H.* Khirni; *M.* Khirni.

A large evergreen tree; common in the dry forests of Khandesh and Gujarat, especially in the Northern districts; also planted along the road side in Gujarat. It bears abundant bright yellow berries which are ready in hot weather. The fruits are sweet and nutritious. When dried the berries keep well for a considerable time. The people from Gujarat like this fruit very much. In Bombay this is sold as *Ahmadabadi Meva.*

*See*—Timbers, Oils, Gums and Resins, Fodder Plants.

### MORUS ALBA Linn.

FAM.—Moraceæ.

COM. NS.—*E.* White Mulberry; *H.* Chini, Tut; *M.* Tuti.

A moderate-sized deciduous tree. Cultivated in gardens in the State. Budded mulberry trees produce very good tasty fruits. There are two varieties—*Black* and *White.* According to the colour of the fruit. The fruit of the white variety can be dried, unlike the black one. The fruits are ready in April.

*See*—Timbers, Fibres, Fodder Plants.

### MUSA PARADICIACA Linn.

### VAR SAPIENTUM Kutz.

FAM.—Musaceæ.

SECTION 7.
Fruit Trees.
(Cultivated)

COM. NS. :—*E.* Banana, Plantain; *G.* Kela; *H.* Kela; *K.* Balehannu; *M.* Kele.

It is chiefly grown in the coastal and Ghat districts where the necessary humidity of the air prevails. It also grows well in deep retentive clayey soils with good drainage as in Khandesh. It occupies the largest area among the fruit crops, in the State about 34,000 acres; E. Khandesh has about 59% of the total area in the State. There are many varieties of Bananas. The *Sonkeli* and *Velchi* of Poona, the *Mutheli, Rajeli* and Red of Thana district, and the ***Rasabali*** of the Karnatak are prized for sweetness and quality. The ***basrai*** is one of the most popular varities in the market. ***Partoli***, *Bichibali dwarf, Sahasrafani* and *Valha* are some of the varieties noted for their high sugar contents. Banana is a highly nutritious fruit. The fruit of nearly all the varieties is consumed in its raw form and also when ripe. The *Rajeli* variety is dried in the Sun for making Sukeli (Banana Figs). The Banana figs are prepared only in certain villages (Agashi) of the Bassein Taluka.

*See*—Medicinal Plants, Fibres, Dyes and Tans, Sacred Plants.

### PERSEA AMERICANA Mill.

FAM.—Lauraceæ.

COM. NS. :—*E.* Avocado, Alligator Pear, Soldier's Butter.

A small tree, native of Tropical America. Introduced into the State some 15 year ago and was grown in the Ganeshkhind Fruit Experimental Farm, Kirkee and at Phaltan. It produces large, pear-shaped fruits. The fruit contains in its hollow centre a large round fleshy seed (as big as a lemon) between which and the thin skin is a thick layer of greenish-yellow pulp, of the consistency of firm butter. This is scooped out with a spoon and eaten either plain or flavoured with salt, pepper and vinegar. There are two varieties, one purple and the other yellow. The former is bigger in size and more skeetish than the latter. It is believed that the fruits produced here (in India) are superior to those produced in America.

### PHŒNIX SYLVESTRIS Roxb.

FAM.—Palmæ.

COM. NS. :—*E.* Wild Date-Palm; *G.* Kujuri; *H.* Khaji; *K.* Kallu; Ichal; *M.* Shindi.

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**Fruit Trees.**
**(Cultivated)**

A tall graceful palm, wild or more often cultivated in Surat, Sholapur and Poona districts in moist situations. Fruit, reddish-yellow when ripe, of the size of a long *bor* is edible.

*See*—Medicinal Plants, Timbers, Fibres, Gums and Resins, Famine Plants.

## PHYSALIS PERUVIANA Linn.

FAM.—Solanaceæ.

COM. NS. :—*E.* Cape Gooseberry ; *H.* Tipari.

A stout straggling bushy herb, said to be a native of Tropical America, cultivated in gardens throughout the State. The fruit is of the size and form of a round *bor* concealed in dry, leafy, bladder-like persistent sepals. When quite ripe it is yellow, has an agreeable and refreshing flavour. It is used for dessert and makes a delicious jam.

## PRUNUS PERSICA Benth.

FAM.—Rosaceæ.

COM. NS. :—*E.* Peach ; *M.* Saptalu.

A small tree, native of China, grown rarely in gardens. There is a small plantation at Panchgani near Mahabaleshwar. The plants do not bear much fruit. Fruits are used for stewing or making jams.

*See*—Oils, Dyes and Tans.

## PSIDIUM GUAYAVA Linn.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Guava ; *G.* Peru, Piyara ; *H.* Amrud ; *K.* Parala ; *M.* Peru.

A small tree ; cultivated all over the Bombay State except in Konkan and N. Kanara. It occupies an area of about 6,000 acres. In the Bombay State the following varieties are commonly grown : Dholka, Nasik, Dharwar, Lucknow, Poona-Local, Miraj and Limbgaon. Lucknow and Dholka varieties are delicious and have soft but few seeds. The other varieties are hard and many seeded. Red

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—
Fruit Trees.
(Cultivated)

pulp strains are occasionally found. The fruit is very popular with the masses. It is eaten both raw and in several kinds of preserves and jellies.

*See*—Medicinal Plants, Dyes and Tans.

### PUNICA GRANATUM Linn.

FAM.—Lythraceæ.

COM. NS.:—*E.* Pomegranate ; *G.* Dadum ; *H.* Anar ; *K.* Dalimbkai ; *M.* Dalimb.

A small tree, native of Iran and the countries round about and N. W. India, cultivated throughout the State except in Konkan. The total area occupied in the State is about 1,200 acres. Dholka in Gujarat and the Poona district are the chief centres of cultivation in the Bombay State. Two varieties are under cultivation. Poona variety has hard seeds, pinkish pulp and the taste is sub-acid. Dholka variety has large soft seeds and white pulp which is very delicious and sweet. The fruit are eaten when quite ripe. In Iran *Dalimb* juice is taken as a drink in hot weather.

*See*—Medicinal Plants, Dyes and Tans.

### RUBUS LASIOCARPUS Smith.

FAM.—Rosaceæ.

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COM. NS. :—*E.* Raspeberry ; *M.* Gauriphal.

An erect prickly shrub. A wild plant at Mahabaleshwar and other places on the Ghats. It is cultivated at Mahabaleshwar. The fruit is small and ripens in hot weather. The berries are eaten and made into jams.

### SYZYGIUM CUMINI Skeel.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Black Plum ; *G.* Jambu ; *H.* Jamenj ; *K.* Neralu ; *M.* Jambul.

A large evergreen tree. Throughout the Bombay State, both wild and cultivated, common along river banks. The fruit ripens in May and June and is much eaten. A *sherbat* prepared from the juice is a very pleasant drink. Preserves are also made from this fruit.

*See*—Medicinal Plants, Timbers, Gums and Resins, Dyes and Tans, Sacred Plants.

## SYZYGIUM JAMBOS Alst.

FAM.—Myrtaceæ.

COM. NS. :— *E.* Rose-Apple; *H.* Gulabjaman; *K.* Jambu; *M.* Gulabi-jamb.

A small evergreen tree. Wild and cultivated. Occasionally grown in the gardens in the State. Some fine trees are planted on the hill-fort of Pratapgad near Mahabaleshwar. Fruit is globose fleshy, pinkish white, scented. Fruit is not very tasty though it is very attractive.

*See*—Medicinal Plants, Timbers.

## TRAPA BISPINOZA Roxb.

FAM.—Onagraceæ.

COM. NS. :—*E.* Water-Chestnut; *G.* Singari, Singoda; *K.* Singada; *M.* Shingada.

A floating herb. Cultivated in tanks in the Konkan and Gujarat. Fruit bony, black when dry, with two straight barbed spines. It is eaten boiled in green state, and it is pleasant to eat. The Hindus use the starch, prepared from dry seeds, on fast days, as a food it is regarded as cool and sweet.

## VITIS VINIFERA Linn.

FAM.—Vitaceæ.

COM. NS. :—*E.* Grape; *G.* Darak; *H.* Angur; *K.* Draksha; *M.* Draksha.

A perennial climbing shrub; believed to be a native of Caucasus mountains. In the Bombay State area occupied by this crop is about 850 acres; out of this nearly 85% area is found in and round about Nasik. The other grape producing districts are Poona,

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Ahmednagar, Satara and Bijapur. There are nine varieties grown on commercial scale.

(1) BHOKRI—One of the popular varieties grown on large scale. Fruit is roundish, skin thick, flesh sweet sour; gets pinkish when fully ripe.

(2) GOSAVI—Does not bear much fruit. Very sweet.

(3) SAHEBI—Berries are long, amber coloured; very sweet in taste; a quality fruit; a shy bearer.

(4) FAKDI—Berries broad at base and pointed at apex; fruits sweet; a quality fruit.

(5) KARAVANDI or BLACK PRINCE—Fruits are small, black, sweet and have delicious flavour.

(6) NILA or BANGLORE PURPLE—Fruits small, roundish. This variety is resistant to Mildew disease.

(7) KALINDI—Fruits are black and round, sweet, shy bearer.

(8) KANDAHARI—Fruit black, size of *Fakdi* variety and better in taste than *Fakdi*.

(9) BLACK or HABSHI—Fruits *Jambul* like; very sweet; very shy bearer.

Grapes are served as table fruit and form an excellent dessert. They are used for prepaing wines in foreign countries. They are dried to form raisins and kismiss in Iran, Baluchistan and Turkey.

*See*—Medicinal Plants.

## ZIZYPHUS JUJUBA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*E.* Indian Cherry-plum; *G.* Ber; *H.* Ber; *K.* Beri hannu, Bore; *M.* Bor.

A small tree; wild and cultivated. Cultivated in Khandesh and Gujarat; found wild all over the State.

There are many varieties of *Bor* and these are based on size, shape, colour, taste, keeping quality, resistance to insect attack, etc. Superior types are found in Khandesh and Gujarat. The pulp is mealy and sweet. The fruit is sometimes dried and pounded (powder being called *borkut*) and eaten with vegetables.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Fodder Plants. Sacred Plants.

## SECTION 8–PLANTS YIELDING SUGARS.

SECTION 8.
—
Sugar Plants.

### BORASSUS FLABELLIFER Linn.

FAM.–Palmæ.

COM. NS. :–*E.* Palmyra Palm ; *G.* Tad. ; *H.* Tad ; *K.* Talimara ; *M.* Tad.

A large erect tree with fan-shaped leaves ; very common in the coastal districts north of Ratnagiri, Kolaba and Thana districts ; Cultivated and self-sown.

The copious amount of sap, obtained by tapping the spadix (inflorescence), is boiled down when fresh ; this gives a brown thick syrup. This is placed in the baskets of palm-leaves to harden, after which it resembles brown toffee, forming palm-sugar or jaggery, which is used locally for sweetmeats, etc. One gallon of sap will usually yield about 1½ lbs. of jaggery.

*See*–Medicinal Plants, Timbers, Fibres, Gums and Resins, Fruit Trees, Liquors.

### CARYOTA URENS Linn.

FAM.–Palmæ.

COM. NS. :–*E.* Wild sago-palm ; *G.* Shiva-Jata ; *H.* Bagni ; *M.* Bherli-mad.

A very handsome palm with cylindrical stem ; flowers in pendulous branched spadix ; common in evergreen forests throughout the Konkan and N. Kanara ; also in the evergreen forests of the western ghats in the Deccan ; much planted in gardens.

The jaggery is obtained from this palm in the same way as above.

*See*–Timbers, Liquors, Ornamental Plants.

### COCOS NUCIFERA Linn.

FAM.–Palmæ.

COM. NS. :–*E.* Cocoanut Palm ; G. Narial ; *H.* Narial ; *K.* Tara : *M.* Naral.

A tall palm tree ; cultivated throughout the State extensively near the sea coast ; common in Konkan and N. Kanara ; also cultivated in-land.

The jaggery is obtained from this palm in the same way as above.

*See*–Medicinal Plants, Timbers, Oils, Fruit Trees, Liquors.

## PHŒNIX SYLVESTRIS Roxb.

FAM.—Palmæ.

COM. NS. :—*E.* Wild date-palm ; *G.* Kujuri ; *H.* Khajari ; *K.* Ichelamara ; *M.* Shindi.

A tall graceful palm with thick hemispherical crown, wild or cultivated, in fairly large quantities in Surat, Sholapur and Poona districts, usually along the banks and beds of streams and water-courses.

Sap is gathered from a V-shaped cut made across the bared portion of the stem. The jaggery is prepared from the juice in the same way as above. The fresh sap called Neera is sweet and forms a pleasant and wholesome drink.

*See*—Medicinal Plants, Timbers Fibres, Fruit Trees, Famine Plants, Liquors.

## SACCHARUM OFFICINARUM Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Sugar-cane ; *G.* Sherdi ; *H.* Ganna ; *K.* Kabbu ; *M.* Us.

A very tall perennial grass with thick fairy stem, cultivated in many districts of the State, particularly Poona, Satara, Ahmednagar, Nasik, Sholapur and Kolhapur districts of the Deccan. The total area under cultivation is about 1,63,974 acres. There are numerous varieties cultivated according to the suitability of soil and climate.

The juice is extracted by crushing the canes in the hand, bullock or power crushers (*Charak*). It is boiled and made into *Gul* by local farmers and it is made into white-sugar in the factories.

Sugarcane is the most important crop giving sugar and also is one of the most important cash crops of the State.

*See*—Medicinal Plants, Fibres, Liquors.

## SECTION 9–FRUIT TREES (Wild).

### ÆGLE MARMELOS Corr.

FAM.–Rutaceæ.

COM. NS. :–*E.* Indian quince; *G.* Bel; *H.* Bel; *K.* Kumbala; *M.* Bel.

A large tree; found in dry hilly places; also cultivated near temples. The fruit varies much in size and shape. It is covered by a hard shell and contains a yellow consistent substance agreeable to taste and smell. A cooling sherbat is prepared from the pulp.

*See*–Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fodder Plants, Sacred Plants.

### ALANGIUM SALVIFOLIUM Wang.

FAM.–Alangiaceæ.

COM. NS. :–*G.* Ankola; *H.* Akoli; *K.* Kallumavu; *M.* Ankol.

A small almost evergreen tree; found throughout the State in dry places; along the banks of nalas in N. Kanara. Fruit small, oblong, purplish-red when ripe; it has acidic astringent taste and is eaten.

*See*–Medicinal Plants, Timbers, Poisonous Plants and Fish Poisons.

### ALLOPHYLUS COBBE Linn.

FAM.–Sapindaceæ.

COM. NS. :–*M.* Mendri, Tipin.

A small tree or shrub often climbing, found in the Deccan and Kokan hills, very common at Mahabaleshwar. Fruit globose, smooth, size of a pea, red when ripe. Ripe fruit is eaten.

### ANTHOCEPHALUS CADAMBA Miq.

FAM.–Rubiaceæ.

COM. NS. :–*G.* Kadamb; *H.* Kadam; *K.* Kaduhale; *M.* Kadamb.

A large tree; found near tanks and villages throughout Konkan and Kanara. The fruit, size of a small orange is sometimes eaten by local people, but is not very palatable.

*See*–Medicinal Plants, Timbers, Sacred Plants.

### ANTIDESMA BUNIUS Spreng.

FAM.–Euphorbiaceæ.

COM. NS. :–*K.* Naikuti; *M.* Amati.

A small evergreen tree; found throughout the Western Ghats and in moist forests of the Konkan and N. Kanara. Fruit, which are small globose, ovoid, smooth, red turning black are edible.

*See*–Timbers.

## ANTIDESMA DIANDRUM Roth.

FAM.—Euphorbiaceæ.

**SECTION 9.**

**Fruit Trees. (Wild).**

COM. NS. :—*H.* Amari ; *K.* Sann Kulipa.

A small deciduous tree, found throughout the State, common in the Konkan and N. Kanara forests. Fruit which is obovate, purplish red, small, succulent, is eaten.

*See*—Timbers.

## ANTIDESMA GHAESEMBILLA Gærtn.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Umtoa ; *K.* Pullum-Purasi ; *M.* Jondhra.

A small deciduous tree, found throughout the State, Vengurla hills in the Konkan, N. Kanara forests. Fruit which is small, ovoid, dark-purple when ripe, is eaten. It has a pleasant sub-acid flavour.

*See*—Timbers.

## ANTIDESMA MENASU Miq.

FAM.—Euphorbiaceæ.

A small tree ; found in the evergreen forests of the Konkan and N. Kanara. Fruit, which is small, ovoid, red, is eaten.

*See*—Timbers.

## ARTOCARPUS HIRSUTA Lam.

FAM.—Uriticaceæ.

COM. NS. :—*K.* Hebnalsina ; *M.* Pat or Ran-phanas.

A very lofty evergreen tree ; found in the evergreen forests of the Konkan and N. Kanara. Deccan—Bhor country. Fruit, size of a large orange, with cylindric straight spines. It contains a pulpy substance much relished by the local people.

*See*—Timbers, Oils, Gums and Resins.

## ARTOCARPUS LAKOOCHA Roxb.

FAM.—Urticaceæ.

COM. NS. :—H. Dhau ; *K.* Watchuli ; *M.* Wotomba.

A large deciduous tree, found in the evergreen forests of the Konkan and N. Kanara. Fruit is of the size of a man's fist, soft hairy, yellow when ripe. It is edible.

*See*—Timbers, Fibres, Dyes and Tans.

## BRIDELA RETUSA Spreng.

FAM.—Euphorbiaceæ.

**SECTION 9.**

**Fruit Trees.**
**(Wild).**

COM. NS. :—*G.* Asana ; *H.* Ganli ; *K.* Garige ; *M.* Asana.

A moderate-sized deciduous tree ; found in deciduous monsoon forests throughout the State. The fruit, globular, succulent, size of a pea, purplish-black when ripe, is sweet and edible.

*See*—Medicinal Plants, Timbers, Fodder Plants.

## BUCHANANIA LANZAN Spreng.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Charoli ; *H.* Char ; *K.* Murukali ; *M.* Charoli.

A moderate-sized deciduous tree ; found in dry and open forests in Konkan, Deccan ; jungles near Baroda in Gujarat. Fruit compressed, smooth, sub-globose, black when ripe, containing a hard nut. Kernel is common substitute for almonds ; it is used in Indian confectionery.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fodder Plants.

## CANTHIUM PARVIFLORUM Lamk.

FAM.—Rubiaceæ.

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COM. NS. :—*M.* Kirni.

A rigid shrub ; found in the Deccan (Kothrud)., S. M. Country and N. Kanara. Fruit small, compressed, oblong-ellipsoid, yellow when ripe. The people of Western India eat this fruit.

*See*—Fibre.

## CAPPARIS APHALLA Roth.

## CAPPARIS HORRIDA Linn.

FAM.—Capparidaceæ.

COM. NS. *H.* Ardanda ; *M.* Tarati.

A climbing thorny shrub found throughout the State in hedges. Fruit subglobose, obtusely four-angled, red-brown. It is made into pickles.

## CAPPARIS APHYLIA Roth.

FAM.—Capparidaceæ.

COM. NS. :—*G.* Ker; *H.* Kari; *K.* Shippri-gidde; *M.* Nepati.

A straggling shrub or a small tree; found common in Cutch, Gujarat and the Deccan in arid and dry regions. Fruit ovoid or globose, long-beaked, red, size of a cherry. The unripe fruit is cooked and eaten.

*See*—Timbers.

## CAPPARIS SPINOSA Linn.

FAM.—Capparidaceæ.

COM. NS. :—*H.* Kalavari; *M.* Kabar.

A diffuse shrub; found in dry beds of streams in many places in the State. Fruit, size of a small lemon, obovoid, ribbed, red when ripe, is pickled.

## CAPPARIS ZEYLANICA Linn.

FAM.—Capparidaceæ.

COM. NS. :—*M.* Govindphal, Wagati.

A rigid shrub; found along the nalas of the Konkan. Fruit irregularly ovoid, rather big, pointed or blunt, bright scarlet when ripe. The raw fruits are made into *bhaji* on the twelfth day (dvadashi) in the month of Ashad.

*See*—Sacred Plants.

## CAREYA ARBOREA Roxb.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Wild guava; *G.* Kumbi; *H.* Kumbhi; *K.* Gavvahannu; *M.* Kumbha.

A middle-sized or large deciduous tree; found throughout the State in monsoon forests; common in S. Konkan and Western ghats. Fruit large, globose crowned with persistant calyx-tube, used as fodder for cattle.

*See*—Medicinal Plants, Timbers, Fibres, Gums and Resins, Fodder Plants.

## CARISSA CARANDAS Linn.

FAM.—Apocynaceæ.

COM. NS. :—*G.* Karmarda; *H.* Karonda ; *K.* Karekai ; *M.* Karavand.

**SECTION 9.**

**Fruit Trees. (Wild).**

A large evergreen spiny shrub; found growing wild in Konkan and Deccan hills, very common in dry, rocky portions. Fruit, a small berry, size of a marble, sub-globose, dark purple, is eaten when ripe. It is sold largely in city markets during the season. Raw fruit is made into pickle. It is also employed in tarts and puddings; for this purpose it is superior to any other Indian fruit.

## CARISSA INERMIS Vahl.

FAM.—Apocynaceæ.

COM. NS. :—Same as C. Carandas.

A large spiny shrub, found in Southern districts of the State, S. M. Country and N. Kanara. Fruit, small, ellipsoid, in appearance like a plum, purple when ripe, is edible. It is very palatable.

## CARISSA SPINARUM Linn.

FAM.—Apocynaceæ.

COM. NS. :—Same as C. Carandas.

A sub-erect evergreen spiny shrub, common in the southern districts of the State on dry stony ground. Fruit smaller and sweeter when ripe than that of *Carissa carandas.*. It is eaten and also made into tarts.

*See*—Dyes and Tans.

## CORDIA MYXA Linn.

FAM.—Boraginaceæ.

COM. NS. :—*E.* Sebastian Plum ; *G.* Pistan ; *H.* Bhokar ; *K.* Challa ; *M.* Bhokar, Gondani.

A large shrub or moderate-sized deciduous tree, found in dry deciduous and moist-monsoon forests, throughout the State in Western Ghats, common in Gujarat. Fruit, small, oval or globular, pale yellow, pulp very viscid, is eaten when ripe. Raw fruits are pickled or used as vegetable.

## CORDIA ROTHII Roem. & Schult.

FAM.—Boraginaceæ.

**SECTION 9.**

**Fruit Trees.**
**(Wild).**

COM. NS. :—*H.* Gundani ; *K.* Kiriselli ; *M.* Gondani.

A small deciduous tree, found throughout the dry districts in the State, often planted and self-sown along the bunds of tanks and near villages. Fruit, size of a pea, orange-yellow, pulp viscous. Though insipid it is eaten.

*See*—Timbers.

## DILLENIA PENTAGYNA Roxb.

FAM.—Dilleniaceæ.

COM. NS. :—*H.* Aggai ; *K.* Kanagola ; *M.* Karmal.

A rather large seasonal tree ; found throughout the State in deciduous forests. Fruit, size of a cherry, globular, smooth, orange-yellow, surrounded by enlarged fleshy sepals, has a pleasant acid taste and is eaten raw or cooked.

*See*—Timbers, Fibres, Fodder Plants.

## DIOSPYROS CHLOROXYLON Roxb.

FAM.—Ebenaceæ.

COM. NS. :—*G.* Nensi ; *M.* Ninai.

A small tree ; common about Surat in Gujarat and in the Nasik district. Fruit, globose, size of a cherry, purplish when ripe, is eaten and is very palatable.

*See*—Timbers.

## DIOSPYROS MELANOXYLON Roxb.

FAM.—Ebenaceæ.

COM. NS. :—*G.* Tamruj ; *H.* Tendu ; *K.* Balai ; *M.* Temru, Temburni.

A middle-sized seasonal tree ; common in the dry deciduous forests of the State. Fruit, globose. It is edible when quite ripe ; it contains yellowish, sweet, soft and highly astringent pulp, highly appreciated during the hot season.

*See*—Timbers, Fodder Plants.

### DIOSPYROS MONTANA Roxb.

FAM.—Ebenaceæ.

**SECTION 9.**

**Fruit Trees. (Wild).**

COM. NS. :—*H.* Tendu ; *K.* Balkuniki ; *M.* Temburni.

A middle-sized seasonal tree, throughout the deciduous forests of the State, common on the N. Kanara Ghats. Fruit globose, size of a large cherry, yellow when ripe, bitter, not edible.

According to Dr. Birdwood the fruit is eaten.

*See*—Timbers, Fodder Plants.

### EHRETIA LÆVIS Roxb.

FAM.—Boraginaceæ.

COM. NS. :—*H.* Darar ; *K.* Karatuke ; *M.* Datrung.

A moderate-sized seasonal tree, throughout the State in deciduous forests, common in the Konkan and N. Kanara and in the Ghats. Fruit, size of a pepper kernel, red, afterwards turns black, rugose ; it is eaten though insipid.

*See*—Timbers, Famine Plants, Fodder Plants.

### EUGENIA CORYMBOSA Lamk.

FAM.—Myrtaceæ.

COM. NS. :—*K.* Bhelsee ; *M.* Ranlavang, Nimbuli.

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A small tree ; throughout the Konkan and N. Kanara, in moist forests and near the sea-coast. Fruit globose, size of a large pea ; it is eaten.

### FICUS GLOMERATA Roxb.

FAM.—Urticaceæ.

COM. NS. :—*E.* Country Fig ; *G.* Umbro ; *H.* Umar ; *K.* Atti ; *M.* Umber.

An evergreen tree, common throughout the State near villages and along the streams and rivers, common in Western Ghats and Konkan. Fruit size and shape of a small fig, purplish when ripe. The ripe fruits are eaten but they are generally too full of insects. Unripe fruits are eaten in times of scarcity.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins, Famine Plants, Fodder Plants, Sacred Plants.

## FICUS RUMPHII Blume.

FAM.—Urticaceæ.

COM. NS. :—*H.* Khabar; *M.* Ashta.

A moderate-sized deciduous tree, found in Western Ghats, Matheran, Mahabaleshwar, Khandala (common). Fruit, globular, smooth, whitish with dark spots when young; nearly black when ripe. It is eaten by local people.

*See*—Timbers, Fibres.

## FLACOURTIA CATAPHRACTA Willd.

FAM.—Flacourtiaceæ.

COM. NS. :—*H.* Talispatri; *K.* Talispatri; *M.* Juguru.

A small deciduous tree, found wild in Konkan, sometimes cultivated. Fruit—oblong or ovoid, size of a plum, bluish-black containing 10-14 compressed seeds. The fruit is slightly acid and is eaten. A curious plan by which the fruit is rendered more palatable, is to slightly squeeze it between the thumb and the forefinger for a minute or two and then roll it gently between the palms of the hands, by which the fruit becomes softer and loses its original asperity.

*See*—Timbers, Oils.

## FLACOURTIA MONTANA Grah. Cat.

FAM.—Flacourtiaceæ.

COM. NS. :—*K.* Han-sampige; *M.* Attak.

A middle-sized thorny tree, found in the Ghats of the Konkan, N. Kanara. Fruit, size of a large cherry, scarlet. It is edible with a pleasant acidic taste when perfectly ripe and makes an excellent jelly.

*See*—Timbers.

## FLACOURTIA RAMONTCHI L'Herit. var. sapida Roxb.

FAM.—Flacourtiaceæ.

COM. NS. :—*G.* Kankod; *H.* Kanju; *K.* Gagal; *M.* Bhekal, Tambat.

A small thorny variable deciduous tree, common in the ghat jungles from Bombay southwards, common near Akrani mahal. Fruit small, roundish, dark red or black, pulpy; it is edible.

*See*—Medicinal Plants, Timbers, Gums and Resins, Fodder Plants.

## FLACOURTIA SEPAIARIA Roxb.

FAM.—Flacourtiaceæ.

**SECTION 9.**

**Fruit Trees.**
(Wild).

COM. NS. :—*M*. Tambat.

A much branched thorny shrub, common in the hilly parts of the Konkan and the Deccan. Fruit, size of a large pea, globular, smooth, is eaten.

## GARCINIA GAMBOGIA Desr.

FAM.—Guttifereæ.

COM. NS. :—*K*. Dharambe ; *M*. Vilayati-amli.

An evergreen middle-sized tree ; found in the evergreen forests of the Western ghats ; abundant in N. Kanara. Fruit, rather large, ovate or oblong-ovate, yellow or reddish, 6-10 furrowed. It is of a pleasant acid taste and is eaten. The rind is acidic and is said to be used for tamarind in curries.

*See*—Timbers, Oils, Gums and Resins.

## GARCINIA INDICA Chois.

FAM.—Guttifereæ.

COM. NS. :—*E*. ;Wild mongosteen *G*. Kokam ; *H*. Kokum ; *K*. Murgal ; *M*. Kokam, Ratamba.

A tall tree with drooping branches, common in Konkan and N. Kanara evergreen forests ; Western coast and Western ghats also cultivated. Fruit, the size of a small orange, purple with an agreeable acid flavour is eaten when ripe. From freshy aril of the seeds a syrup is prepared for use during the hot months. Dried rind called *amsul* is used in curries.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Condinents and Spices.

## GARCINIA XANTHOCHYMUS Hook f.

FAM.—Gutteferaæ.

COM. NS. :—*H*. Dampal ; *K*. Deavkai ; *M*. Jharambi

A medium-sized beautiful evergreen tree, found in Western Ghats, abundant in the evergreen forests of N. Kanara. Fruit, the size of an apple, subglobose or oval, yellow, smooth ; it is temptingly beautiful. It is strongly acidic in the fleshy rind than the pulp, which is eaten by local people.

*See*—Timbers, Dyes and Tans, Gums and Resins.

### GLYCOSMIS PENTAPHYLIA Corr.

FAM.—Rutaceæ.

SECTION 9.

Fruit Trees. (Wild).

COM. NS. :—*K.* Manikyan ; *M.* Kirmira.

An erect shrub, common throughout the moist evergreen forests of the Konkan and N. Kanara. Fruit, size of a large pea globose, smooth, pinkish-white or cream coloured. It is commonly eaten.

### GMELINA ARBOREA Roxb.

FAM.—Verbenaceæ.

COM. NS. :—*G.* Savan ; *H.* Gumbhar ; *K.* Shivani ; *M.* Shivan.

A moderate-sized deciduous tree, throughout the State in monsoon forests, common in the Satpudas and Dangs. Fruit ovoid, fleshy, smooth, yellow when ripe. It is eaten by poorer classes in the Satpudas and also by cattle.

*See*—Medicinal Plants, Timbers, Fodder Plants.

### GREWIA MICROCOS Linn.

FAM.—Tiliaceæ.

COM. NS. :—*M.* Asolin, Shirul.

A large shrub, Western Peninshula from the Konkan (in this hills) south-wards, common in N. Kanara in forests or open spaces. Fruit, size of a pea, purplish when ripe, sweet and is eaten.

*See*—Fibres.

### GREWIA PILOSA Lamk.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Kirkali ; *M.* Khatkati.

A shrub or a small tree, throughout the State in deciduous forests, Sinhgad hill near Poona. Fruit, hairy, size of a pea, yellowish brown, rind tough, is eaten.

### GREWIA POLYGAMA Roxb.

FAM.—Tiliaceæ.

COM. NS. :—*M.* Gowli.

A small tree, common in the Konkan, Western ghats. Fruit small, hairy, brownish, sweet, is eaten.

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SECTION 9.

Fruit Trees. (Wild),

## GREWIA TILIÆFOLIA Vahl.

FAM.—Tiliaceæ.

COM. NS. :—*G.* Dhamana ; *H.* Pharsa ; *K.* Taddasu ; *M.* Dhamani.

A moderate-sized tree, throughout the deciduous forests of the State, common in N. Kanara. Fruit globose, size of a pea, bluish-black when ripe, with an acid flavour, is eaten.

*See*—Timbers, Fibres, Fodder Plants.

## GREWIA VILLOSA Willd.

FAM.—Tiliaceæ.

A shrub, throughout the State in dry districts ; Konkan ; Gujarat. Fruit globose, size of a cherry, rind tough, smooth, yellowish-red, pulp sweet, is eaten.

## MABA NIGRESCENS Dalz.

FAM.—Ebenaceæ.

COM. NS. :—*K.* Hole-kuncha ; *M.* Kari, Raktarohida.

A large shrub or a small tree, in the evergreen forests of the Konkan and N. Kanara, common on the N. Kanara ghats. Fruit, small, round, smooth, yellow when ripe, is said to be palatable and is eaten by the poorer classes.

*See*—Timbers.

## MELASTOMA MALABATHRICUM D. C.

FAM.—Melastomaceæ.

COM. NS. :—*K.* Ankerki ; *M.* Nankeri, Palore, Lakheri.

A large shrub, throughout the Konkan (common) and N. Kanara forests along the banks of nalas near evergreen forests. Fruits, broadly ovoid, size of a jujube. The pulp of the fruit, which is purplish-black, is edible, tasting something like a blackberry ; it stains the mouth black.

*See*—Dyes and Tans.

## MEMECYLON EDULE Roxb.

FAM.—Melastomaceæ.

COM. NS. :—*K.* Archeti, Harchari ; *M.* Anjani.

A large shrub or a small tree ; very common at Mahableshwar and Matheran ; Konkan. Fruit small berry, globose, purplish-black, pulp astringent. They are eaten by local people when ripe.

*See*—Dyes and Tans.

### MESUA FERREA Linn.

FAM.—Guttifereæ.

SECTION 9.

Fruit Trees. (Wild).

COM. NS. :—*H.* Naghas ; *K.* Nagsampige ; *M.* Nagchampa.

Large evergreen tree, throughout the evergreen forests of Konkan and N. Kanara. Fruit of a variable size often the size of a pigeon's egg, ovate, acuminate, dark-brown, wrinkled, has the taste of a chestnut. It is eaten by local people.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins.

### NEPHELIUM LONGANA Camb.

FAM.—Sapindaceæ.

COM. NS. :—*K.* Kankindali ; *M.* Wumb.

A small tree, in the evergreen forests of the Konkan and N. Kanara. Fruit, globose size of a small marble, reddish, tubercled. It is eaten when young but is not so palatable as cultivated litchi (*N. Litchi*).

### NOTHOPEGIA COLEBROOKIANA Blume.

FAM.—Anacardiaceæ.

COM. NS. :—*K.* Mattigar ; *M.* Amberi.

A moderate-sized tree, common in the evergreen forests of the Konkan and N. Kanara ghats. Fruit, transversely oblong, depressed, red when ripe. It is edible and is like a plum.

*See*—Timbers.

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### OLEA DIOICA Roxb.

FAM.—Oleaceæ.

COM. NS. :—*E.* Indian Olive ; *K.* Akki ; *M.* Par-jamb.

A small tree, very common all along the ghats. Very common in Konkan—Matheran, Deccan, N. Kanara. Fruit small, globose, purplish, one-seeded. It is used in curries or pickle. The fresh fruit is an article of food in famine times.

*See*—Timbers.

### OSYRIS ARBOREA Wall. Cat

FAM.—Santalaceæ.

COM. NS. :—*K.* Kuriganda ; *M.* Lotal.

A large shrub, on the ghats—Khandala, Mahabaleshwar, S. M. Country, dry forests. Fruit, small, sub-globose, red when ripe. It is sweet and very pleasant.

**SECTION 9.**

**Fruit Trees.**
(Wild).

## PAVETTA INDICA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Kankra ; *K.* Sulebottu ; *M.* Papat.

A stout bushy shrub, very common on hills throughout the State, Mahabaleshwar (very common). Fruit globose, black, smooth. It is pickled and eaten in some parts of Madras.

Flowers are used as food by the hill people of Matheran (Lisboa).

*See*—Medicinal Plants, Fodder Plants.

## RANDIA DUMATORUM Lamk.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Mindhola ; *H.* Karhar ; *K.* Mangarikai ; *M.* Gelphal.

A small seasonal tree, common throughout the State in the deciduous monsoon and dry forests, common at Mahabaleshwar. Fruit, size of a lemon, globose or ovoid, yellowish when ripe. It is roasted and eaten when ripe. It is also used to poison fish.

*See*—Medicinal Plants, Timbers, Fodder Plants, Poisonous Plants and Fish Poisons.

## RANDIA ULIGINOSA D. C.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Kauria ; *H.* Katul ; *K.* Kare ; *M.* Pindra.

A small seasonal tree ; throughout the State, often in abandoned rice fields ; common in deciduous forests. Fruit, ellipsoid, yellow. It is eaten, cooked or roasted by poor classes.

*See*—Timbers, Fodder, Plants.

## SALVADORA OLEOIDES Dene.

FAM.—Salvadoraceæ.

COM. NS. :—*G.* Khakananutala ; *H.* Jhal ; *M.* Pilu.

A large evergreen shrub or a small tree, found in dry places and saline soils, confined to Gujarat districts. Fruit, small, globose, yellow when ripe. They are eaten by local people. It is sweetish. It is often dried for future use and has then much the appearance and flavour of currants.

*See*—Timbers, Oils, Fedder Plants.

### SALVADORA PERSICA Linn.

FAM.—Salvadoraceæ. . .

**SECTION 9.**
—
**Fruit Trees**
**(Wild).**

COM. NS. :—*E.* Tooth-brush Tree ; *G.* Piludi ; *H.* Pilu ; *K.* Goni ; *M.* Khakan, Pilu.

A large evergreen much branched shrub found in the dry districts in the State, also found in saline soils and littoral forests near the coast of Gujarat, Konkan and N. Kanara. Fruit, small globose, smooth, fleshy, red when ripe, is eaten by local people.

*See*—Medicinal Plants, Timbers, Oils, Fodder Plants.

### SCHLEICHERA OLEOSA Merr.

FAM.—Sapindaceæ.

COM. NS. :—*G.* Kossama ; *H.* Kosum ; *K.* Kukuli ; *M.* Kusum.

A large beautiful seasonal tree, common throughout the State in both dry and moist forests. Fruit ovoid. The fruit contains a whitish pulp, which has a pleasant sub-acid taste and is often eaten during hot, dry weather by the people, who ascribe to it cooling properties.

*See*—Medicinal Plants, Timbers, Oils, Fodder Plants.

### SECURINEGA LEUCOPYRUS Muell.

FAM.—Euphorbiaceæ.

COM. NS. :—*M.* Pandharphali.

A large rigid straggling bush, found throughout the State, usually in open situations. Fruit small, white, globose, berry. It is edible.

### SECURINGGA OBOVATA Muell.

FAM.—Euphorbiaceæ.

COM. NS. :—*K.* Bili-horli ; *M.* Padharphali.

A large shrub, found throughout the State widely spread in deciduous forests. Fruit small, globose, fleshy, white. It is edible.

*See*—Poisonous Plants and Fish poisons.

## SEMECARPUS ANACARDIUM Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Marking nut tree; *G.* Bhilamu; *H.* Bhilava; *K.* Keru; *M.* Biba.

A moderate-sized seasonal tree, found in dry deciduous forests throughout the State, abundent in dry forests of Konkan, Deccan and Gujarat. Fruit oblong, smooth, shining, purplish-black. The ripe yellow fleshy cups on which the fruit rests is slightly acrid in taste and is eaten by local people. The kernels of the nuts are also eaten.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Poisonous Plants and Fish Poisons.

## SIDEROXYLON TOMENTOSUM Roxb.

FAM.—Sapotaceæ.

COM. NS. :—*K.* Gomale; *M.* Kumbal.

A middle-sized, evergreen, spiny tree, found commonly in the evergreen forests of the Konkan and N. Kanara Ghats. Fruit, ovate, size of an olive, yellow. It is eaten in curries and made into pickles by the local people.

## TREWIA NUDIFLORA Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Pindara; *K.* Kadu-kange; *M.* Petari.

A large seasonal tree; throughout the Konkan and N. Kanara in monsoon forests, along nalas and in swampy places. Fruit globose, depressed, size of a small lemon, hoary. The pulp under the rind is sweet and edible.

*See*—Medicinal Plants, Timbers, Fodder Plants.

## VANGUERIA SPINOSA Roxb.

FAM.—Rubiaceæ.

COM. NS. :—*K.* Gund-kare; *M.* Alu.

A large spiny shrub or a small tree, common in the deciduous forests of the Konkan, Mawal, and N. Kanara. Fruit, globular, fleshy, smooth, yellowish, aromatic. It is eaten by local people when ripe but it is not very palatable.

*See*—Fodder Plants.

## VITIS INDICA Linn.

FAM.—Vitaceæ.

**SECTION 9.**

**Fruit Trees (Wild).**

COM. NS. :—*E.* Indian Wild Vine; *K.* Huttige-balik; *M.* Randraksha.

A scandent shrub; found in the evergreen forests of the Konkan and N. Kanara ghats. Fruit, small, ovoid-oblong, smooth, purple berry. They are sweet and palatable.

## ZIZYPHUS ŒNOPLIA Mill.

FAM.—Rhamnaceæ.

COM. NS. :—*H.* Makai; *K.* Kaner balli; *M.* Burgi.

A straggling shrub, throughout the moist forests of the Deccan, Konkan and N. Kanara. Fruit small, globose oboivod, black, shining. It ripens in the rains. It is edible.

## ZIZYPHUS ROTUNDIFOLIA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*H.* Gar-ber, Jangra; *K.* Parpali gidda.

A small shrub, very common in Gujarat, and S. M. Country; Fruit small globose, red when ripe. It has a pleasant acid flavour and is eaten during times of scarcity by the local people.

## ZIZYPHUS RUGOSA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*K.* Suna-boorli; *M.* Toran.

A large straggling armed shrub, sometimes climbing; very common throughout the ghats in the State, Konkan ghats, Deccan, Mahabaleshwar, Khandala. Fruit small, whiter cream-coloured, globose or pyriform. It is eaten by the people of the ghats when ripe.

## SECTION 10—FODDER PLANTS.

**SECTION 10.**

**Fodder Plants.**

**Fodder Crops. (Grass)**

This section includes (1) The important fodder crops from the *grass* (Graminæ) and the *pulse* (Leguminosæ) families, (2) some most important wild fodder grasses and legumes, and (3) the forest trees and shrubs used as fodder for animals.

### (1) FODDER CROPS FROM THE GRASS FAMILY (Gramineæ).

### ANDROPOGON SORGHUM Brot.

COM. NS. :—*E.* Great millet; *G.* Jawar; *H.* Juar; *K.* Jola; *M.* Jondhala, Jwari.

Extensively grown as an annual crop in the Bombay State. It produces under a great variety of conditions, large quantities of palatable fodder in a minimum of time.

Though Jowar is mainly a grain crop, the following varieties are specially grown for fodder only during the two seasons—Kharif and Rabi—in different localities :—

(1) Sundhia, (2) Dudhia, (3) Nilwa, (4) Utavali, (5) Hundi, (6) Kalbondi, (7) Shalu (includes Maldandi and Dagdi), (8) Amber (American *var.*), (9) Collier (American *var.*), (10) Imphi (African *var.*).

The stalks are generally fed dry in the form of *Kadba*; they are also occasionally fed green or made into silage. The plant is not cut and used as fodder until the flowering stage owing to its being poisonous to stock in its earlier stages.

*See*—Poisonous Plants and Fish Poisons.

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### AVENA SATIVA Linn.

COM. NS. :—*E.* Oat; *M.* Oat.

An annual grass. This has not been grown as a fodder crop to an appreciable extent except on military grass farms in the State, where it is fed to horses. This is an excellent fodder for animals especially for horses.

### BRACHIARIA MUTICA Stapf.

COM. NS. :—*E.* Mauritius water-grass, Para grass.

A perennial grass. Natives of South America introduced into the State in 1894. It thrives well in damp water-logged places, on the banks of canals, tanks and ditches, with a rainfall from 50 to 200 inches. It provides heavy yield of good fodder throughout the year. The fodder is coarse but sweet and nutritious. It has a good reputation as a pasture grass. It is palatable when young. Once planted it gives cuttings for about 5 to 8 years.

### CHLORIS GAYANA Kunth.

**SECTION 10.**

**Fodder Plants.**

**Fodder Crops. (Grass)**

COM. NS. :—*E.* Rhodes Grass.

An annual or perennial grass. Native of South Africa. It grows on any kind of soil except stiff clays; not much grown in the State. It is exceedingly valuable fodder and is very nutritious. It is fed green to cattle and horses.

### ECHINOCHLOA COLONA Link, var. frumentacea Blatter & McCann.

COM. NS. :—*M.* Sawa.

An annual grass. When sown in monsoon and cut in August this crop makes an excellent fodder for milch cattle. It can be fed green or made into silage.

### ECHINOCHLOA STAGNINA Beauv.

COM. NS. :—*G.* Banti; *M.* Banti, Barti.

An annual grass. When sown in Monsoon and cut in August this crop makes an excellent fodder for milch cattle. It can be fed green or made into silage.

*See*—Food Plants.

### ELEUSINE CORACANA Gærtn.

COM. NS. :—*G.* Bavto; *H.* Ragi; *K.* Ragi; *M.* Nachni, Nagli.

An annual grass. It is considered to be a good fodder for cattle. It is fed green or made into silage when the seed is approaching maturity. It is valued highly in the Ratnagiri district.

*See*—Medicinal Plants, Food Plants, Liquors.

### EUCHLAENA MEXICANA Schrad.

COM. NS. :—*E.* Teosint.

A large, very succulent, strong growing annual grass. Native of Mexico. Cultivated in Poona, for green fodder as an experimental measure. It does not stand drought well.

### PANICUM ANTIDOTALE Retz.

COM. NS. :—*E.* Blue Panic.

A perennial grass. It thrives well in medium black and sandy soils with a rainfall from 10 to 30 inches. It is drought resistant and keeps green in hot season. It is also useful for soil conservation. It is palatable when young. Once planted it gives cuttings for nearly 3 years.

## PANICUM MAXIMUM Jacq.

COM. NS. :—*E.* Guinea Grass; *M.* Gini gavat.

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**Fodder Plants.**
**Fodder Crops.**
**(Grass)**

A perennial grass. Native of Tropical Africa introduced into India about 1800 A. D. This grass has a very special place among fodder crops. It is of very good value as supplying a good, succulent, nutritious fodder throughout the year. Its peculiar advantage is that it grows well under shade (especially under mango trees), while a small daily supply of good green feed can be obtained without any cost by planting it on the sides of permanent water channels. It can be used to make a very good silage.

## PANICUM MILIACEUM Linn.

COM. NS. :—*G.* Cheno; *H.* Berri; *K.* Baragu; *M.* Vari.

An annual grass. Grown as a fodder crop only in Gujarat. It thrives well in hot weather under irrigation and provides an excellent fodder in large quantities at the time when other fodders are scarce.

*See*—Food Plants.

## PANICUM MILIARE Lam.

COM. NS. :—*G.* Gadro; *H.* Shawan; *K.* Save; *M.* Halvi Vari.

Same as preceding.

*See*—Food Plants.

## PASPALUM DILATATUM Poir.

COM. NS. :—*E.* Golden Crown Grass, Large Water Grass.

A tall grass. Native of South U. S. A. Introduced in India in 1902 as a measure of avoiding famine and as a grass which would thrive under drought conditions, when other grasses die. It has proved to be of very little use.

## PENNISENTUM CILIARE Link.

COM. NS. :—*M.* Anjan.

A perennial grass. It thrives well in medium black soils with a rainfall of about 20 to 30 inches. It is good for grasslands and stands browsing; also useful for soil conservation. It is palatable at all stages. Once planted it gives cuttings for 3 to 4 years.

## PENNISETUM POLYSTACHYUM Schult.

COM. NS. :—*E.* Thin Napier Grass.

A perennial grass suited for lighter waste lands with a rainfall from 15 to 100 inches. It is good for grasslands and bunds and for heavy rainfall tract. It is palatable when young. Once planted it gives cuttings for 3 years.

### PENNISETUM PURPUREUM Schum & Thonn.

SECTION 10.

Fodder Plants.

Fodder Crops. (Grass)

COM. NS. :—*E*. Elephant or Thick Napier Grass.

A perennial grass. Native of South Africa. It grows well on medium black and rich soils. It is drought resistant but responds to irrigation. It is rather a fibrous grass but relished by cattle when young. It gives good green fodder and makes good silage, not suited for hay. Once planted it gives cuttings for nearly 5 years.

### PENNISETUM SPICATUM Roem & Schult.

COM. NS. :—*E*. Bull-rush millet; *G*. Bajra; *H*. Bajra; *K*. Sajje; *M*. Bajri.

An annual grain crop. Grows in light types of soils. The stalks are fed green to cattle; not so good a fodder when dry. Grains are used as cattle feed for milch cattle.

### SETARIA ITALICA Beauv.

COM. NS. :—*E*. Italian Millet; *G*. Kang; *H*. Kangoone; *K*. Navane; *M*. Rala.

An annual millet. Grown in Gujarat as a fodder crop. It is quick growing and gives palatable material to animals.

The fodder derived from Rala, is stated in America to be injurious to horses, when largely used, but no injury is caused to cattle or sheep.

*See*—Food Plants.

### ZEA MAYS Linn.

COM. NS. :—*E*. Maize; *G*. Makai; *H*. Bhuta, Makai; *K*. Makkejola; *M*. Maka.

An annual crop. It stands second to Jowar as a fodder crop. It is cultivated all over the State but extensively in Panch Mahal District of Gujarat. It is grown throughout the year as a dry or irrigated crop. Stalks are excellent fodder for cattle. They are generally fed green in a flowering stage. Maize makes excellent silage.

*See*—Food Plants.

SECTION 10.
—
**Fodder Plants.**
—
Fodder Crops.
(Grass)

## FODDER CROPS FROM THE LEGUME FAMILY (Leguminosæ).

### CYAMOPSIS TETRAGONOLOBA D. C.

COM. NS. :–*E.* Cluster-bean; *G.* Guvar; *H.* Gasara; *K.* Guvarkai; *M.* Guvar.

It is a valuable cattle feed both in the form of grain and green matter. As a pulse crop, it is only grown in Gujarat, Satara and Belgaum Districts. The pulse is chiefly fed to cattle and horses.

*See*–Vegetables.

### DOLICHOS BIFLORUS Roxb.

COM. NS. :–*E.* Horse-gram; *G.* Kulthi; *H.* Kulthi; *K.* Huruli; *M.* Hulga, Kulith.

The green crop is a good feed for cattle and sheep. Pulse is given to horses after boiling.

*See*–Medicinal Plants, Oils, Food Plants.

### DOLICHOS LABLAB Linn.

COM. NS. :–*G.* Wal; *H.* Ballar; *K.* Avare; *M.* Wal.

The leaves and stalks form a very good fodder for milch cattle. The husk and broken bits of dal are also fed to cattle.

*See*–Vegetables.

### GLYCINE SOJA Sieb & Zucc.

COM. NS.–E. Soya Bean.

An annual crop, since 1905-06, several experiments were made, to grow this as a fodder crop, in different tracts of the State. It has definitely proved a failure as a rain crop, but shows considerable promise as an irrigated *rabi* crop. The fodder is rich in proteins and is more fibrous. It is probably most suitable for feeding when the pods are well formed.

### LATHYRUS SATIVUS Linn.

COM. NS. :–*E.* Chickling Vetch; *G.* Lang; *H.* Khesari; *M.* Lakh.

A *rabi* crop, grown extensively in Gujarat. The plants are used as fodder for work cattle and are supposed to be very nutritious.

*See*–Medicinal Plants, Food Plants, Poisonous Plants and Fish Poisons.

SECTION 10.

—

Fodder Plants.

—

Fodder Crops . (Grass)

## MEDICAGO SATIVA Linn.

COM. NS. :—*E.* Lucern ; *H.* Lasunghas ; *K.* Vilayati-hullu ; *M.* Vilayati gavat.

A most important leguminous fodder crop in the world. It is said to be a native of Western Temperate Asia. Extensively grown throughout the State under irrigation as a forage crop, especially for horses. It flourishes practically in any soil which is not water-logged or saline. Crop lasts for four years. It is used as a green fodder all over, for which it should not be cut too early; young leaves if eaten directly from the field and without considerable supply of dry fodder being given at the same time, is liable to cause tympanitis in cattle and sheep though not in horses.

## PHASEOLUS ACONITIFOLIUS Jacq.

COM. NS. :—*G.* Math ; *H.* Matki ; *K.* Madihe ; *M.* Matki.

An annual crop grown over all the State during the rains. The stalks and leaves are used as a fodder for cattle.

*See*—Food Plants.

## PHASEOLUS MUNGO Linn.

COM. NS. :—*G.* Adad ; *H.* Urid ; *K.* Uddu ; *M.* Udid.

It is both a *kharif* and a *rabi* crop grown all over the State. The stalks and leaves are a good fodder for cattle.

*See*—Medicinal Plants, Food Plants.

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## PHASEOLUS RADIATUS Linn.

COM. NS. :—*E.* Green Gram ; *G.* Mag ; *H.* Mung ; *K.* Hesaru ; *M.* Mug.

It is both a *kharif* and a *rabi* crop grown practically all over the State, generally mixed with cereals. The leaves and stalks are very good fodder for cattle.

*See*—Medicinal Plants, Food Plants.

## PISUM ARVENSE Linn.

COM. NS. :—*E.* Pea ; *G.* Vatana ; *H.* Matar ; *K.* Batagodle ; *M.* Vatana.

It is both *kharif* and *rabi* crop. Grown mostly in the Deccan and Gujarat. The leaves and stalks are used as fodder for cattle.

*See*—Vegetables, Food Plants.

## TRIGONELLA FOENUM-GRAECUM Linn.

COM. NS. :–*E.* Fenugreak; *G.* Methi; *H.* Methi; *K.* Menthe palle; *M.* Methi.

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**Fodder Plants.**
**Fodder Crops.**
**(Grass)**

An annual crop grown all over the State in garden lands. The mature stalks are an excellent fodder for cattle.

*See*–Medicinal Plants, Vegetables, Condiments and Spices.

## VIGNA CATJANG Walp.

COM. NS. :–*E.* Cow Pea; *G.* Ghola; *H.* Lobia; *K.* Alsandi; *M.* Chavli.

It is generally a *kharif* crop grown all over the State either alone or in combination with millets. The green stalks and leaves are good fodder for milch cattle.

*See*–Vegetables.

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## SOME MOST IMPORTANT WILD FODDER GRASSES.

FAM.—Gramineæ.

### AMPHILOPHIS PERTUSA Stapf.

### (ANDROPOGON PURTUSUS Willd.)

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**Fodder Plants.**
**Fodder Crops.**
**(Wild Grasses)**

COM. NS. :—*M.* Ghanya marvel.

An annual, low, perennial grass; common in most bungalow compounds and open grazing places. In a wild state it spreads along the ground. It prefers black soil; cultivation promotes growth in height and luxuriance of foliage. It is a medium type of pasture and is useful in grazing mixture and for ensilage. Its spreading habit serves as a soil-binder.

### ANDROPOGON PUMILUS Roxb.

COM. NS. :—*G.* Zingvo; *M.* Lal gavat, Tambrut.

An annual low grass found in dry and semi-dry tracts; most common in black and medium black soils. Cattle eat the fodder both green and dry but prefer it green.

### APLUDA VARIA var. ARISTATA Hack.

COM. NS. :—*G.* Bhumburu, Dhanghi-khad; *M.* Phuler, Poklya.

An annual grass with rather broad leaves; common throughout the State in sheltered bushy places. It is a fair fodder and is relished by cattle when young.

### BRACHIARIA ISACHNE Stapf.

### (PANICUM ISACHNE Roth.)

COM. NS. :—*G.* Khariu; *K.* Shimpigyan-hullu; *M.* Shimpi.

A delicate, annual grass; commonly found as a weed in rich soils among irrigated crops. It is an excellent green fodder. Cattle are very fond of this grass; it increases milk yield.

### BRACHIARIA RAMOSA Stapf.

### (PANICUM RAMOSUM Linn.)

COM. NS. :—*M.* Char, Chasura.

An annual, much branched grass; it is either erect or ascending from a shortly creeping base. It is a sub-gregarious grass found in fairly good soils and as a weed in fields. It is good fodder.

**SECTION 10.**

**Fodder Plants.**

**Fodder Crops. (Wild Grasses)**

## CENCHRUS BIFLORUS Roxb.

COM. NS. :—*M.* Anjan, Dhaman.

An annual or semi-perennial grass; generally growing in sandy soils; found in Gujarat and along river banks in Khandesh. It is one of the nutritious of fodder grasses. It increases the milk yield. It is mostly grazed to milch cattle. It gives good hay.

## CHLORIS BARBATA Sw.

COM. NS. :—*K.* Zende balad-hullu; *M.* Gondval.

A perennial grass of medium height; found to grow roundabout villages where soil is whitish; grows in large tufts in pasture grounds. It is a medium type of fodder. It is best grazed in mixture with other grasses. Cattle eat it up to the time of flowering.

## CHLORIS VIRGATA Sw.

COM. NS. :—*G.* Gadhiu, Khariu; *K.* Ganjali-hullu; *M.* Gondegavat.

A tufted leafy annual sub-gregarious grass; found all over on old walls of houses, hill-slopes, along railway lines. It is a medium type of grass. It is best fed at the flowering stage.

## CHRYSOPOGON MONTANUS Trin.

## (ANDROPOGON MONTICOLA Schult.)

COM. NS. :—*G.* Suthia-khad; *K.* Kare-hullu; *M.* Dand, Dongrigavat.

A very variable perennial grass; fairly common in the State, found in heavy as well as scanty rainfall tracts. It occurs along the bunds of fields and the slopes of stony hills, forming patches of many individuals. It is an excellent fodder before flowering. Bullocks are found to relish it in green condition, before flowering.

## CYNODON DACTYLON Pers.

COM. NS. :—*E.* Bahama-Bermuda grass; *G.* Dhro; *H.* Durba; *K.* Garikehallu; *M.* Durva, Harali.

A perennial grass; stem prostrate, widely creeping, forming matted tufts; grows abundantly everywhere and flowers throughout the year. Under favourable conditions it becomes a pest in cultivated fields especially in garden soils. This is one of the most important fodder grasses. Under favourable conditions it grows sufficiently tall to be cut as hay, widely utilised as a lawn grass.

*See*—Medicinal Plants, Sacred Plants.

### DACTYLOCTENIUM ÆGYPTIACUM Richt.

### (ELEUSINE ÆGYPTIACA Desf).

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—
**Fodder Crops, (Wild Grasses)**

COM. NS. :—*G.* Anchi-manchi ; *K.* Hakki-kalin-hullu ; *M.* Navi-ragi.

An annual small grass ; grows best in well drained rich soil. It is considered to be a good nutritious fodder, especially when young.

### DICHANTHIUM ANNULATUM Stapf.

### (ANDROPOGON ANNULATUS Forsk.)

COM. NS. :—*G.* Zinzuo ; *K.* Marvelyan-hullu ; *M.* Marvel.

A medium-sized densely tufted perennial grass, stem usually erect ; grows almost in any kind of soil with fairly good moisture. One of the best known and most appreciated of the wild grasses of the State. It is an excellent fodder, for cattle. As a green fodder it gives good results with milch animals. It makes hay of good quality and can be turned into silage.

### DICHANTHIUM CARICOSUM A. Camus.

### (ANDROPOGON CARICOSUS Linn.)

COM. NS. :—Same as the preceeding species.

A big tufted perennial grass ; stem erect or ascending from creeping base forming tufts at the rooting nodes ; grows in soil having fairly good moisture, more common in hedges along river beds and field bunds.

USES :—The same as the preceeding species.

### DIGITARIA MARGINATA var. fimbriata Stapf.

### (PASPALUM SANGUINALE var. ciliare Hook. f.)

COM. NS. :—*G.* Arotaro ; *K.* Kalam-hullu ; *M.* Revga, Suka.

An annual grass ; growing commonly as a weed in cultivated fields all over the State. It is a good fodder grass ; it is much relished by cattle as it is soft and pleasant to eat. It is found to increase the yield of milk.

### DINEBRA ARABICA Jacq.

COM. NS. :—*G.* Kharia ; *K.* Halgyan-hullu ; *M.* Lona.

An annual grass. One of the commonest weeds of irrigated crops ; grows freely in soil in low lying, slightly swampy areas ; grows luxuriantly on heavy clay soils with alkali traces. It is considered as a very good fodder. It is best fed green at the flowering stage. It has a marked effect on increasing yield of milk.

### ECHINOCHLOA COLONA Link.

### (PANICUM COLONUM Linn.)

COM. NS. :—*M.* Pakud.

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**Fodder Plants.**

Fodder Crops.
(Wild Grasses)

An annual grass; commonly found growing in rich cultivated fields and on the bunds of fields after the crops have been cut away. It is considered as one of the best grasses. It is greedily eaten by cattle before and after flowering. The grain is sometimes used by poorer classes as food.

### EREMOPOGON FOVEOLATUS Stapf.

### (ANDROPOGON FAVEOLATUS Del.)

COM. NS. :—*M.* Kadu-marvel.

A perennial grass, densely tufted; it is a sporadic grass growing on barren uplands, abundant in Dharwar district, and rocky grounds in the Deccan. It is a good fodder grass though it tastes slightly bitter.

### HETEROPOGON CONTORTUS Rœm. & Schult.

### (ANDROPOGON CONTORTUS Linn.)

COM. NS. :—*E.* Spear grass; *G.* Sunkhali; *K.* Ganjali-hullu; *M.* Kusali.

There are two forms of this grass (1) annual, which is small, growing in soils varying from very poor to rather medium type, (2) perennial, which is large and tufted growing in medium to good types of soils. Very common all over the State. It is a fairly rich grass for feeding purposes; it is most nutritious in the flowering stage but at this stage awns (spears) appear which are injurious to the cattle. It is therefore necessary to feed or graze the grass just before flowering.

### HETEROPOGON INSIGNIS Thw.

### (ANDROPOGON TRITICEUS R. Br.)

COM. NS. :—*M.* Bhale kusal, Mothi kusal.

A tall perennial grass, common in arid and semi-arid parts of the State. Though it has a considerable feeding value, it is not considered as a good fodder because of less leafy nature, coarse stems and injurious awns (spears). The best time to feed the grass is just before the flowers appear.

### ISCHÆMUM ARISTATUM Linn.

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**Fodder Plants.**

**Fodder Crops. (Wild Grasses)**

COM. NS. :—*M.* Bangadi.

A perennial grass, rather stout; growing on hills and low lands with high rainfall, such as Konkan and Western ghats. A medium type of fodder grass, generally found in mixture with other grasses in the Thana district.

### ISCHÆMUM PILOSUM Hack.

COM. NS. :—*G.* Khavo ; *K.* Kanigyan-hullu ; *M.* Kunda.

A tall perennial deep-rooted grass, with rhizomes giving out leafy stolons. One of the worst weeds of cultivation in certain tracts; flourishes in deep black rich soils. The grass is succulant before flowering and is a good fodder when young. It is best fed before flowering or when just in flower. It is one of the commonest grasses for hay-making in Sholapur and Ahmednagar districts.

### ISCHÆMUM RUGOSUM Salisb.

COM. NS. :—*M.* Ber.

An annual grass ; common in wet marshy ground ; it is generally found as a weed in rice fields. A medium type of fodder grass, generally found mixed with other grasses, in Thana and Kolaba districts.

### ISEILEMA ANTHEPHOROIDES Hack.

COM. NS. :—*K.* Jajjagyan-hullu ; *M.* Tambad-gota.

A much tufted annual grass with pink stems, leafy below , growing on hill sides and well drained positions in black, medium black and garden soils ; most abundant in parts of Konkan and Mawal. The yield is small. It is best fed in flowering stage.

### ISEILEMA LAXUM Hack.

COM. NS. :—K. Chamge ; M. Tambit, Tambrut.

A perennial grass ; growing on hill sides and plains with fairly good soil practically all over the State except Gujarat. It is considered to be one of the best fodder grasses.

### ISEILEME WIGHTII Anders.

COM. NS. :—*G.* Moshi ; *M.* Gondwal, Tambit.

A tall thin perennial grass ; found all over the State in moist places in black soils ; found considerably in Poona and Thana districts. It is a medium type of fodder ; it makes hay of fine quality.

## SEHIMA NERVOSUM Stapf.

## (ISCHÆMUM LAXUM R. Br.)

COM. NS. :–*G.* Sukal; *M.* Pavna, Sheda.

A perennial grass of medium height forming dense tufts; sub-gregarious, growing in medium black soil in tracts of light and medium rainfall, all over the State except Konkan; very common in Karnatak. It is valued as a green fodder and also as hay. It is best fed in the flowering stage. It can be fed green, grazed, made into hay or turned into silage.

## SEHIMA SULCATUM Camus.

## (ISCHÆMUM SULCATUM Hack.)

COM. NS. :–*M.* Pavna, Sheda.

An annual grass of medium height, with gregarious habit; growing in medium black soils in areas of light and medium rainfall. Feeding time and uses, as in the preceding species.

## SORGHUM HALEPENSE Pers.

## (ANDROPOGON HALEPENSIS Brot.)

COM. NS. :–*G.* Baru; *M.* Boru.

A tall perennial grass; stems erect, stout; a gregarious grass found all over the State, common in cultivated and uncultivated soils; grows in hedges and banks of water-courses; can stand salt in the soil. A good fodder grass.

## SORGHUM PURPUREO-SERICEUM Aschers. & Schweinf.

## (ANDROPOGON PURPUREO-SERICEUS Hochst.)

COM. NS. :–*M.* Bokhari.

A tall annual robust grass; grows in medium black soil. It is rather common in plains of Nasik and Khandesh districts. It is a fair fodder. Cattle relish it best before flowering.

## THELEPOGON ELEGANS Roth.

COM. NS. :–*G.* Bodga; *M.* Pharodi.

An annual grass; sub-gragarious in habit; found all over the State in well-drained stony or light soils. It is a very succulent grass and is accordingly eaten by cattle both green and dry, but they prefer green.

### THEMEDA QUADRIVALVIS O. Kuntz.

### (ANTHISTIRIA CILIATA Linn.)

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**(Wild Grasses)**

COM. NS. :—*G.* Bhatharu ; *M.* Bongrut, Phulgavat.

A tall annual grass ; common all over the State, often found in hilly districts. Very common during the monsoon ; also flourishes during the dry weather. It is regarded as a bulky grass of fair fodder value. It is readily eaten when green.

### THEMEDA TREMULA Hack.

### (ANTHISTIRIA TREMULA Anders.)

COM. NS. :—*M.* Bongrut.

An annual or semiperennial grass ; found growing in hilly parts of the State. It is considered to be a good fodder.

### THEMEDA TRIANDRA Forsk.

### (ANTHISTIRIA IMBERBIS Retz.)

COM. NS. :—*M.* Bongrut, Karad.

A tall perennial densely tufted grass. These species are the commonest of the Themeda genus ; growing on hills as well as on plains throughout the State. It sometimes covers large patches of land to the exclusion of almost every other species. It is a very good fodder and hay.

### UROCHLOA HELOPUS Stapf.

### (PANICUM JAVANICUM Hook f.)

COM. NS. :—Kuri, Kuriya.

An annual grass growing in cultivated land and on pasture grounds all over the State. Considered to be a good fodder both for cattle and horses.

### UROCHLOA REPTANS Stapf.

### (PANICUM PROSTRATUM Lam.)

COM. NS. :—*M.* Chimichara.

A slender annual grass ; it has generally a creeping stem rooting at nodes ; found growing on plains and in cultivated fields all over the State. It has got more erect habit when it grows in rich cultivated ground. Considered to be one of the most nutritious fodder grasses for cattle.

## SOME MOST IMPORTANT WILD FODDER-LEGUMES.

FAM.—Papilionaceæ.

### ALYSICARPUS LONGIFOLIUS W. & A.

COM. NS. :—*G.* Ghania ; *M.* Shevara.

A tall annual plant growing in grass lands and pastures in Konkan, Deccan and Gujarat. The leaves only are eaten by cattle in green stage. It is a fair fodder ; it is useful for making silage.

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**Fodder Plants.**
Fodder Crops.
(Wild Grasses)

### ALYSICARPUS PUBESCENS Law.

COM. NS. :—*M.* Shevara.

An erect herbaceous plant ; a very common plant found in grasslands in Konkan, Deccan. It is a fair fodder ; leaves are eaten by cattle in green stage.

### ALYSICARPUS RUGOSUS D. C. var. HEYNEANUS Baker.

COM. NS. :—*M.* Shevara.

A tall annual common in the State especially in Konkan, Deccan and Gujarat. The leaves only are eaten by cattle in green stage. It is a fair fodder and is useful for making silage.

### CALOPOGONIUM MUCUNOIDES Desv.

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A perennial plant recently introduced as a pasture legume in the State. It grows well in light as well as medium black soils with fairly good rainfall. A fairly good fodder.

### CENTRASIMA PUBESCENS Benth.

A plant with spreading habit newly introduced as a pasture legume in the State. It grows well in higher rainfall tracts on slopes and plains with light to medium black soils. A fairly good fodder.

### HEYLANDIA LATEBROSA D. C.

COM. NS. :—*M.* Godhadi.

A prostrate spreading herb growing in grasslands as well as a weed of cultivation. Very common especially in the Deccan. It is best relished by buffaloes before flowering, but can be eaten in flower stage also. It can also be made into silage if not required for immediate use.

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(Wild Grasses)

### INDIGOFERA CORDIFOLIA Heyne.

COM. NS. :–*M.* Bechka.

A diffuse copiously branched annual with cordate leaves, usually clothed with long white hairs, found in rather dry localities. Common all over the State except Kanara. It is a fair fodder.

*See*–Famine plants.

### INDIGOFERA GLANDULOSA Willd.

COM. NS. :–*G.* Zinjru, *M.* Barbada.

An herbaceous annual common weed with tri-foliate leaves,, found in Konkan, Deccan, in good garden and well-drained soils. It is a good fodder in green condition, before flowering. One or two cuttings can be taken before flowering.

### INDIGOFERA LINIFOLIA Retz.

COM. NS. :–*G.* Dania ; *M.* Pandharphali.

A small herbaceous annual with very narrow leaves, found growing in rather dry localities in Konkan, and Deccan. In wild state it is rather prostrate. It is a fair fodder.

*See*–Famine Plants.

### INDIGOFERA TRIFOLIATA Linn.

COM. NS. :–*K.* Malmandi.

An herbaceous perennial shrub growing in rich soils particularly in Konkan, Deccan and Gujarat. It is a good fodder in green condition before flowering.

### SESBANIA ACULEATA Poir.

COM. NS. :–*G.* Dhadhan ; *M.* Ran-shevari.

An annual plant of rapid growth sometimes reaching nearly 3 m. in height. It can stand fairly damp conditions. Very common in wet places throughout the Konkan and the Deccan. Sheep and goat are very fond of the leaves. It can be used for silage.

*See*–Fibres.

### TEPHROSIA PURPUREA Pers.

COM. NS. :–M. Unhali.

A much branched herbaceous perennial, found growing in dry districts of the State. It is a fair fodder before flowering. It can be made into silage.

## TREES AND SHRUBS USED AS FODDER FOR ANIMALS.

(Particularly when there is scarcity of Fodder Crops and Grasses, and sometimes under normal conditions also).

**SECTION 10.**

**Fodder Plants.**

Fodder Crops, (Trees & Shrubs)

### ACACIA ARABICA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Baval ; *H.* Kikar ; *K.* Jali, Karijali ; *M.* Babhul.

A moderate-sized or large thorny tree growing throughout the State in the black soil areas of the dry districts. Tender shoots, leaves and pods are eaten by sheep and goats.

*See*—Medicinal Plants, Timbers, Fibres.

### ACACIA CATECHU Willd. var. SUNDRA Prain.

FAM.—Mimosaceæ.

Leguminoseæ.

COM. NS. :—*G.* Kherio ; *H.* Khair ; *K.* Kachu ; *M.* Khair.

A moderate-sized thorny tree growing along the coasts of Konkan and N. Kanara ; also scattered throughout the State in the dry and moist forests.

Lower and smaller branches are eaten by sheep and goats.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins, Sacred Plants.

### ACACIA FERRUGINEA D. C.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Khaiger ; *K.* Banni ; *M.* Pandra Khair.

A large deciduous spiny tree growing in forests of Konkan, Dangs and Gujarat. Lower and smaller branches are eaten by sheep and goats.

*See*—Timbers, Gums and Resins, Liquors.

### ACACIA INTSIA Willd.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Chilar.

A large climbing thorny shrub ; common throughout the State in deciduous forests.

Leaves are eaten by sheep and goats.

*See*—Dyes and Tans.

## ACACIA JACQUEMONTI Benth.

FAM.—Mimosaceæ

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**(Trees & Shrubs)**

COM. NS. :—*G.* Ratobauli.

A small bushy thorny shrub. Growing on the plains of Gujarat Leaves are eaten by sheep and goats.

*See*—Gums and Resins.

## ACACIA LEUCOPHLOEA Willd.

FAM.—Mimosaæ.

COM. NS. :—*G.* Haribaval; *H.* Safed-kikar; *K.* Bili-jali; *M.* Hiver.

A moderate-sized or large deciduous spiny tree growing throughout the Deccan in dry districts.

Leaves and pods are eaten by sheep and goats.

*See*—Timbers, Fibres, Dyes and Tans, Gums and Resins, Famine Plants, Liquors.

## ACACIA SUMA Kurz.

FAM.—Mimosaceæ.

COM. NS. :—*K.* Magali; *M.* Son-khair.

A small tree with hooked twin spines growing usually in moist places along the nalas.

Leaves and young branches are eaten by sheep and goats.

*See*—Timbers, Dyes and Tans.

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## ACANTHUS ILICIFOLIUS Linn.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Marandi.

An erect stout shrub growing in salt marshes; found along the banks of tidal rivers and creeks throughout Konkan and N. Kanara.

Leaves are eaten by cattle, sheep and goats.

## ACTINODAPHNE HOOKERI Meissn.

FAM.—Lauraceæ.

COM. NS. :—*K.* Tudgensu; *M.* Pisa.

A middle-sized evergreen tree growing in the rain forests along the ghats, Konkan and evergreen forests of N. Kanara.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils.

## ADHATODA VASICA Nees.

FAM.—Acanthaceæ.

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Fodder Crops.
(Trees & Shrubs)

COM. NS. :—*G.* Aduso; *H.* Adalso; *K.* Adusoge; *M.* Adulsa.

A dense shrub; commonly cultivated in hedges throughout the State; abundant in the Deccan and Konkan.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Oils, Dyes and Tans.

## ADINA CORDIFOLIA Benth.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Haladwan; *H.* Haldu; *K.* Hedde; *M.* Haldu.

A large deciduous tree common throughout the State in deciduous forests.

Leaves are eaten by cattle.

*See*—Timbers.

## AEGLE MARMELOS Corr.

FAM.—Rutaceæ.

COM. NS. :—*G.* Bel; *H.* Bel; *K.* Bela; *M.* Bel.

A small or moderate-sized thorny tree; cultivated or wild in dry situations throughout the State.

Twigs and leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fruit Trees (w), Sacred Plants.

## AILANTHUS EXCELSA Roxb.

FAM.—Simarubeaceæ.

COM. NS. :—*G.* Moto-aduso; *H.* Maharuk; *K.* Dodda-mara; *M.* Maharuk.

A handsome large tree; common in Gujarat round about Broach and Baroda; also planted in Khandesh.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Gums and Resins.

## ALBIZZIA AMARA Boiv.

FAM.—Mimosaceæ.

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Fodder Crops.
(Trees & Shrubs)

COM. NS. :—*K.* Tugli ; *M.* Lullai.

A middle-sized deciduous tree growing throughout the State in dry forests.

Leaves are eaten by cattle.

*See*—Timbers, Gums and Resins.

## ALBIZZIA LEBBAK Benth.

FAM.—Mimosaceæ.

COM. NS. *G.* Kaloshirish ; *H.* Kalshish ; *K.* Sirisa ; *M.* Shirish.

A tall deciduous tree growing throughout the State in dry and moist forests ; planted along road-side.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Sacred Plants.

## ALBIZZIA ODORATISSIMA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Kalo-serasio ; *H.* Siris ; *K.* Billavar ; *M.* Kalashirish.

A tall, almost evergreen tree common in the moist forests of the Konkan and N. Kanara, and also in the dry Deccan.

Young brancnes are eaten by cattle.

*See*—Timbers, Gums and Resins.

## ALBIZZIA PROCERA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*H.* Safed siris ; *K.* Bellati ; *M.* Kinhai.

A large deciduous tree growing throughout the State ; common in the Konkan and N. Kanara moist forests, also along rivers and nalas in dry districts.

Leaves are eaten by cattle.

*See*—Timbers, Dyes and Tans, Gums and Resins, Poisonous Plants and Fish Poisons.

### ALBIZZIA STIPULATA Boiv. [ALBIZZIA CHINENSIS Merr.]

FAM.—Mimosaceæ.

COM. NS. :—*G.* Shamber ; *H.* Siran ; *K.* Kal-bege ; *M.* Udal.

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Fodder Crops.
(Trees & Shrubs)

A large evergreen tree common in the evergreen forests of the Konkan and N. Kanara ghats.

Young branches are eaten by cattle.

*See*—Timbers, Gums and Resins.

### ANOGEISSUS LATIFOLIA Wall.

FAM.—Combretaceæ.

COM. NS. :—*G.* Dabria ; *H.* Dhava ; *K.* Dindiga ; *M.* Dhavda.

A large deciduous tree ; very common throughout the State, usually in dry deciduous forests.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins.

### ANTHOCEPHALUS CADAMBA Miq.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Karam ; *K.* Kadaga ; *M.* Kadamb, Niv.

A large deciduous tree ; common near villages throughout the Konkan ; often cultivated ; rare in N. Kanara forests.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Sacred Plants, Ornamental Plants.

### ARGYRIA SPECIOSA Sweet.

FAM.—Convolvulaceæ.

COM. NS. :—*G.* Samudrashosh, Samardar-sokh ; *K.* Samudraballi ; *M.* Samudrashok.

A very large stout climber ; growing near villages in Konkan and Deccan ; cultivated in gardens for its flowers.

Leaves are eaten by cattle.

*See*—Medicinal Plants.

### ARTOCARPUS INTEGRA (Thunb) Merril.

FAM.—Urticaceæ.

COM. NS. :—*G.* Vanas ; *H.* Chakki ; *K.* Panesa ; *M.* Phanas.

A large evergreen tree ; indigenous in the forests of Western Ghats ; cultivated near villages throughout Konkan and N. Kanara.

Leaves and rind of ripe fruit are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fibres, Dyes and Tans ; Gums and Resins, Fruit Trees.

### ARTOCARPUS LAKOOCHA Roxb.

FAM.—Urticaceæ.

COM. NS. :—*H.* Dahu ; *K.* Watchuli ; *M.* Wotomb.

A large deciduous tree growing in the evergreen forests of the Konkan and N. Kanara.

Leaves are eaten by cattle.

*See*—Timbers, Fibre Plants, Dyes and Tans, Fruit Trees.

### BALANITES ROXBURGHII Planch.

FAM.—Simarubiaceæ.

COM. NS :—*H.* Hingu ; *K.* Ingiluka ; *M.* Hinganbet.

A spiny shrub or a small tree growing throughout the driest parts of the State on open situations.

Young leaves and twigs are eaten by cattle.

*See*—Timbers, Oils.

### BARRINGTONIA ACUTANGULA Gærtn.

FAM.—Myrtaceæ.

COM. NS. :—*G.* Samudraphal ; *H.* Samudraphal ; *K.* Mavinkumbia ; *M.* Ingli, Samudraphal.

A small evergreen tree growing in swampy places, banks of rivers and streams in the Konkan and N. Kanara ; common near the coast.

Bark is eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans.

## BAUHINIA PURPUREA Linn.

FAM.—Cæsalpiniaceæ.

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COM. NS. :—*H.* Kaniar ; *K.* Kanchivala ; *M.* Devakanchan.

A moderate-sized evergreen bushy tree ; wild in dry forests of the Konkan and the Deccan ; also cultivated in gardens.

Leaves are eaten by cattle.

*See*—Timbers, Fibres, Dyes and Tans, Ornamental Plants.

## BAUHINIA RACEMOSA Lam.

FAM.—Cæsalpiniaceæ.

COM. NS. :—H. Gurial ; *K.* Banne ; *M.* Apta.

A small deciduous tree growing throughout the State in deciduous forests.

Leaves are eaten by cattle.

*See*—Timbers, Fibres, Sacred Plants.

## BAUHINIA VAHLII W. & A.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*M.* Chambvel.

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A gigantic climber found in the moist forests of the Konkan ghats.

Branches are eaten by cattle.

*See*—Fibres, Dyes and Tans.

## BAUHINIA VARIEGATA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*G.* Kovidar ; *H.* Kaniar ; *K.* Kangivale ; *M.* Kanchan.

A medium-sized deciduous tree ; planted throughout the State often as a road-side tree.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## BOSWELLIA SERRATA Roxb.

FAM.—Burseraceæ.

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COM. NS. :—*G.* Dhup; H. Salgond; *K.* Guggula; *M.* Salai.

A moderate-sized deciduous tree; common in hills in the Deccan; very abundant in the Satpudas and Khandesh forests.

Leaves are eaten by buffaloes.

*See*—Medicinal Plants, Timbers, Gums and Resins.

## BRIDELIA RETUSA Spreng.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Asana; *A.* Gauli; *K.* Garige; *M.* Asana.

A moderate-sized deciduous tree growing throughout the State in deciduous forests; tolerably common in the Deccan and Konkan hills.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans.

## BUCHANANIA LANZAN Spreng.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Charoli; *H.* Char; *K.* Charpoppu; *M.* Charoli.

A moderate-sized deciduous tree growing throughout the State in open deciduous forests.

Leaves are eaten by buffaloes.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## BUTEA MONOSPERMA O. Kuntz.

FAM.—Papilionaceæ (Leguminosæ).

COM. NS. :—*G.* Khakaro; *H.* Dhak; *K.* Kuttugga; *M.* Palas.

A moderate-sized deciduous tree; common in deciduous forests throughout the State.

Old leaves are eaten by buffaloes.

*See*—Medicinal Plants, Timbers, Fibres, Oils, Dyes and Tans, Gums and Resins, Sacred Plants, Ornamental Plants.

### BUTEA SUPERBA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Palasvel.

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A gigantic climber growing in the forests of N. Konkan and Kanara.

Old leaves are eaten by cattle, especially buffaloes.

*See*—Fibres, Dyes and Tans.

### CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Akdo; *H.* Ak.; *K.* Arka; *M.* Rui.

A large shrub with milky juice; common throughout the State in dry waste places.

Dried leaves are eaten by sheep and goats.

*See*—Medicinal Plants, Fibres, Gums and Resins, Sacred Plants.

### CALOTROPIS PROCERA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*H.* Madar; *M.* Mandar.

An erect shrub with milky juice; common in the dry parts of the State.

Dried leaves are eaten by sheep and goats.

*See*—Medicinal Plants, Fibres, Gums and Resins.

### CAREYA ARBOREA Roxb.

FAM.—Myrtaceæ.

COM. NS. :—*G.* Kumbi; *H.* Kumbhi; *K.* Gauvahannu; *M.* Kumbha.

A middle-sized deciduous tree; common throughout the State in monsoon forests; also in valleys and ravines in drier areas.

Fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fibres, Dyes and Tans, Gums and Resins.

### CASSIA FISTULA Linn.

FAM.—Cæsalpinaceæ.

COM. NS. :—*G.* Garmala; *H.* Amaltas; *K.* Kakka; *M.* Bahava.

A moderate-sized deciduous tree; common throughout the State in mixed monsoon forests; planted as an ornamental road-side tree.

Twigs, leaves and pods are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins, Sacred Plants, Ornamental Plants,

### CELASTRUS PANICULATA Willd.

FAM.—Celastraceæ.

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COM. NS. :—*G*. Malhangana; *H*. Malkamni; *K*. Kangli; *M*. Malkangoni.

A large deciduous climber; growing in hedges and along river sides and nala banks, and also in hilly parts throughout the State.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Oils.

### CLERODENDRON PHLOMOIDES L. f.

FAM.—Verbenaceæ.

COM. NS. :—*G*. Arni; *M*. Irun.

A large bush; common in hedges throughout the State, especially in drier parts.

Leaves are eaten by buffaloes.

### CLERODENDRON SERRATUM Moon.

FAM.—Verbenaceæ.

COM. NS. :—*G*. Bharangi; *H*. Bharangi; *K*. Gantubarangi; *M*. Bharang.

A small shrub; growing throughout the State, often in deciduous forests.

Leaves are eaten by buffaloes.

*See*—Medicinal Plants.

### COCCULUS HIRSUTUS Diels.

FAM.—Menispermaceæ.

COM. NS. :—*G*. Vevdi; *H*. Jamtikihel; *K*. Sugadi-balli; *M*. Vasanvel.

A straggling, scandent shrub; common in hedges throughout the State.

Leaves are eaten by buffaloes,

*See*—Medicinal Plants,

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## COCHLOSPERMUM RELIGIOSUM (L) Alst.

FAM.—Cochlospermaceæ.

COM. NS. :—*H.* Kumbi ; *K.* Kad-buraga ; *M.* Ganeri.

A small deciduous tree ; grows in the dry deciduous forests of the Deccan ; common in the Satpudas.

Leaves and flowers are eaten by buffaloes.

*See*—Timbers, Oils, Gums and Resins.

## COLEBROOKIA OPPOSITIFOLIA Smith.

FAM.—Labiatæ.

COM. NS. :—*K.* Tuggi-gedda ; *M.* Bhamani.

A much branched shrub ; common throughout the Ghats in Konkan and N. Kanara ; hills in the Deccan.

Leaves are eaten by buffaloes.

## COMBRETUM OVALIFOLIUM Roxb.

FAM.—Combretaceæ.

COM. NS. :—*M.* Madvel.

A large scandent shurb ; common in the jungles of Konkan and Ghats.

Leaves and young shoots are eaten by buffaloes.

## CORDIA MACLEODII Hook f.

FAM.—Boraginaceæ.

COM. NS. :—*H.* Dahipalas ; *K.* Hadang ; *M.* Dahivan.

A middle-sized deciduous tree ; growing in the forests of Konkan, S. M. Country and N. Kanara.; often planted as road-side tree in southern drier districts.

Leaves and young shoots are eaten by buffaloes.

*See*—Timbers.

## DALBERGIA LANCEOLARIA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Gengri ; *H.* Takoli ; *K.* Harrani ; *M.* Dandus.

A beautiful deciduous tree ; growing in the deciduous forests of the Konkan, Khandesh and N. Kanara.

Leaves and young shoots are eaten by cattle.

*See*—Timbers, Oils.

### DALBERGIA LATIFOLIA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Sissu ; *K.* Biti ; *M.* Sisum.

A tall deciduous tree ; growing throughout the deciduous forests of the State ; Common in S. Konkan.

Leaves and young shoots are eaten by cattle.

*See*—Timbers, Oils, Gums and Resins.

### DALBERGIA SISSOO Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Sisam, Tanach ; *H.* Shisham ; *K.* Biridi ; *M.* Shisvi.

A handsome deciduous tree ; planted throughout the State ; believed to be indigenous in Gujrat.

Leaves and young shoots are eaten by cattle.

*See*—Timbers, Oils.

### DALBERGIA VOLUBILIS Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*K.* Mardiballi ; *M.* Alai.

An erect shrub ; common throughout the forests of the State.

Leaves are eaten by cattle.

### DENDROCALAMUS STRICTUS Nees.

FAM.—Gramineæ.

COM. NS. :—*H.* Bans ; *K.* Kili -bidara ; *M.* Udha, Vasa.

A deciduous densely tufted bamboo growing throughout the State in deciduous forests.

Leaves are eaten by cattle.

*See*—Timbers, Fibres, Famine Plants.

### DERRIS SCANDENS, Benth.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Motha Shirili.

A very large climber ; throughout the Konkan and N. Kanara from the sea-coast inland.

Leaves and pods are eaten by cattle.

*See*—**Fibres.**

## DESMODIUM CEPHALOTUS Wall. *var.* CONGESTUM Prain.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Lapoti.

A small shrub growing in the moist forests of the Konkan and N. Kanara.

Leaves are eaten by cattle.

## DESMODIUM LATIFOLIUM D.C.

FAM.—Papilionaceæ.

An erect undershrub growing in the moist forests of Konkan, Deccan and N. Kanara.

Leaves are eaten by cattle.

*See*—Fibres.

## DICHROSTACHYS CINEREA W. & A.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Sigamkati.

A much branched thorny shrub; common on dry stony hills all over; cultivated in N. Kanara.

Leaves and pods are eaten by cattle.

*See*—Fibres.

## DILLENIA PENTAGYNA Roxb.

FAM.—Dilleniaceæ.

COM. NS. :—*H.* Aggai; *K.* Kanagalu; *M.* Karmal.

A middle-sized deciduous tree growing throughout the State in deciduous forests.

Young leaves and fruits are eaten by cattle.

*See* Timbers, Fibres.

## DIOSPYROS EMBRYOPTERIS Pers.

FAM.—Ebenaceæ.

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COM. NS. :—*G.* Zeebervo; *H.* Tendu; *K.* Gavandu, Tumari; *M.* Temburni.

A small evergreen tree growing near creeks and back-waters along the coasts of the Konkan and N. Kanara; also in the rain-forests and river-beds in the ghats.

Young leaves and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## DIOSPYROS MELANOXYLON Roxb.

FAM.—Ebenaceæ.

COM. NS. :—*G.* Tamruj; *H.* Tendu; *K.* Thumbri; *M.* Temru.

A middle-sized deciduous tree; common in the dry deciduous forests of the State.

Young leaves and fruits are eaten by cattle.

*See*—Timbers, Fruit Trees.

## DIOSPYROS MONTANA Roxb.

FAM.—Ebenaceæ.

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COM. NS. :—*H.* Lohari, Tendu; *K.* Balkuniki; *M.* Temburni, Temru.

A small or middle-sized spiny tree growing throughout the deciduous forests of the State; Common in the Ghats.

Leaves are eaten by cattle.

*See*—Timbers, Fruit Trees (W).

## DOLICHANDRONE FALCATA Seem.

FAM.—Bignoniaceæ.

COM. NS. :—*K.* Gudmurki; *M.* Medshingi.

A middle-sized deciduous tree growing in the deciduous forests of the Konkan and N. Kanara.

Young leaves are eaten by cattle.

*See*—Timbers, Fibres.

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### EHRETIA LÆVIS Roxb.

FAM.—Boraginaceæ.

COM. NS.—*H.* Datranga, Darar; *K.* Adakbagari; *M.* Datrang.

A middle-sized deciduous tree growing throughout the State in deciduous forests.

Young leaves are eaten by cattle.

*See*—Timbers, Fruit Trees (W), Famine Plants.

### ELÆODENDRON GLAUCUM Pers.

FAM.—Celastraceæ.

COM. NS. :—*G.* Alan; *H.* Bakra; *K.* Mukariki; *M.* Aran, Tamruj.

A small tree (grows sometimes to a great height) growing throughout the State in deciduous forests; also in N. Kanara.

Young leaves are eaten by cattle.

*See*—Timbers, Gums and Resins.

### EMBLICA OFFICINALIS Pers.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Amala; *H.* Amlika; *K.* Amalaka; *M.* Avla.

A small or middle-sized tree growing throughout the State in deciduous forests; wild and planted.

Leaves and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resin, Fruit Trees, Sacred Plants.

### ERYTHRINA VARIEGATA Linn. Var. ORIENTALIS Merr.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Panarvo; *H.* Pangira; *K.* Hongara; *M.* Pangara.

A tall deciduous prickly tree growing along sea-coast in the Konkan and N. Kanara. Planted as supports for pepper and grape-vines.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fibres, Dyes and Tans, Gums and Resins.

### ERYTHRINA SUBEROSA Roxb.

FAM.—Papilionaceæ.

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COM. NS. :—*H.* Pangra; *M.* Pangara.

A moderate-sized prickly deciduous tree growing throughout the dry forests of the State.

Leaves are eaten by cattle.

*See*—Timbers.

### FERONIA ELEPHANTUM Corr.

FAM.—Rutaceæ.

COM. NS. :—*G.* Kavit; *H.* Kait; *K.* Byala; *M.* Kavath.

A large deciduous thorny tree growing wild throughout the State in dry situations; common in the Konkan and Deccan.

Leaves are eaten by sheep and goats.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins, Fruit Trees.

### FICUS GLOMERATA Roxb.

FAM.—Urticaceæ.

COM. NS. :—*G.* Umbro; *H.* Gular; Umar; *K.* Atti; *M.* Umber.

An evergreen tree; common throughout the State near villages and along streams and rivers; also planted along road-side.

Leaves and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins.

### FICUS HISPIDA Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Dhed-umera; *H.* Gokla, Kangsha; *M.* Dhed, Kala-umber.

A shrub or a small tree; throughout the Konkan and N. Kanara along the river-banks and in moist situations.

Leaves are eaten by cattle.

*See*—Timbers, Fibres.

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## FICUS INFECTORIA Roxb.

Fam.—Urticaceæ.

COM. NS. :—*G.* Pepri; *H.* Khabar; *K.* Kari-basri; *M.* Lendva. Pakari.

A large spreading deciduous tree growing usually in dry forests throughout the State; Often planted along road-side.

Leaves are eaten by cattle.

*See*—Timbers, Fibres.

## FICUS RELIGIOSA Linn.

Fam.—Urticaceæ.

COM. NS. :—*G.* Pipal; H. Pipal; *K.* Aswathamara; *M.* Pimpal.

A large evergreen tree. Planted near temples and villages throughout the State.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fibres, Gums & Resins, Famine Plants, Sacred Plants.

## FICUS RETUSA Linn.

Fam.—Urticaceæ.

COM. NS. :—*H.* Pinwal; *K.* Pili-mara; *M.* Nandruk.

A moderate-sized handsome evergreen tree; commonly planted along road-side throughout the State.

Leaves are eaten by cattle.

*See*—Timbers.

## FLACOURTIA RAMONTCHI L'Hert.

Fam.—Flacourtiaceæ.

COM. NS. :—*G.* Kankod; *H.* Kanju; *K.* Gajal; *M.* Bhekal.

A small thorny deciduous tree. Common in the ghat jungles from Bombay southwards; also in Khandesh, Satpudas.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Gums and Resins.

### FLUGGEA LEUCOPYRUS Willd.

FAM.—Euphorbiaceæ.

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COM. NS. :—*H.* Ainta ; *M.* Pandharphali.

A large rigid spiny bush or a small tree, growing in open situations throughout the State.

Leaves are eaten by sheep and goats.

### GARDENIA LATIFOLIA Ait.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Papra ; *K.* Kalkambi ; *M.* Ghogar, Pandru.

A small deciduous tree, common in the dry forests in the State.

Leaves are eaten by cattle.

*See*—Timbers.

### GARUGA PINNATA Roxb.

FAM.—Burseraceæ.

COM. NS. :—*H.* Ghogar ; *K.* Aranelli, Balagi ; *M.* Kakad.

A large deciduous tree growing in dry deciduous forests in the State ; common in the Konkan and the Deccan hills.

Leaves are eaten by cattle.

*See*—Timbers, Dyes and Tans, Gums and Resins.

### GMELINA ARBOREA Roxb.

FAM.—Verbenaceæ.

COM. NS. :—*G.* Savan ; *H.* Gumbhar, Shivan ; *K.* Kumbudi, Shivani ; *M.* Shiwan.

A moderate-sized tree growing throughout the State in deciduous forests ; Common in the Satpudas, Khandesh, Dangs.

Fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers.

### GREWIA TILIÆFOLIA Vahl.

FAM.—Tiliaceæ.

COM. NS. :—*G.* Dhamana ; *H.* Dhamin ; *K.* Butale ; *M.* Dhamani.

A moderate-sized tree growing throughout the State in deciduous forests.

Leaves are eaten by buffaloes.

*See*—Timbers, Fibres.

## GREWIA LÆVIAGATA Vahl.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Gurguri; *M.* Gulgollop.

A small tree growing near village site and deciduous forests in Konkan and N. Kanara; not common.

Leaves and twigs are eaten by buffaloes.

*See*—Fibres.

## GUAZUMA TOMENTOSA Kunth.

FAM.—Sterculiaceæ.

COM. NS. :—*E.* Bastard cedar; *M.* Rudrakshi.

A small evergreen tree; cultivated in gardens throughout the State; not indigenous.

Leaves are eaten by cattle.

*See*—Timbers, Fibres, Famine Plants.

## HAMILTONIA SUAVEOLENS Roxb.

FAM.—Rubiaceæ.

COM. NS.—*M.* Gidesa, Jitsai.

A small deciduous shrub growing on hills in the Konkan, Deccan and N. Kanara.

Leaves are eaten by cattle.

*See*—Medicinal Plants.

## HARDWICKIA BINATA Roxb.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*H.* Anjan; *K.* Kamra; *M.* Anjan.

A deciduous tree growing in the dry forests in the State; common on the Satpudas in Khandesh.

Leaves are eaten by cattle.

A very good green fodder.

*See*—Timbers, Fibres, Gums and Resins.

### HELIANTHUS ANNUUS Linn.

FAM.—Compositæ.

COM. NS. :—*G.* Surajmaki; *H.* Surajmukhi; *M.* Suryaphul.

A large hairy shrub; grown in gardens throughout the State for its beautitul flowers.

All parts of the plant are eaten by cattle.

*See*—Fibres, Oils, Dyes and Tans.

### HELICTERES ISORA Linn.

FAM.—Sterculiaceæ.

COM. NS. :—*G.* Murdasing; *H.* Jankaphal; *K.* Murudi; *M.* Murudsheng.

A large shrub growing throughout the forests of the State; abundant as an undergrowth of many N. Kanara-ghat forests.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Fibres.

### HETEROPHRAGMA ROXBURGHII D. C.

FAM.—Bignoniaceæ.

COM. NS. :—*K.* Adwinuggi; *M.* Wurus.

A large tree growing throughout the State in deciduous forests; very common in the ghats.

Leaves are eaten by cattle.

*See*—Timbers.

### HIPTAGE BENGHALENSIS Kurz.

### (HIPTAGE MADABLOTA Gærtn.)

FAM.—Malpighiaceæ.

COM. NS. :—*G.* Madhavi; *H.* Madhalata; *K.* Adimurtte, Madhavi; *M.* Haladvel, Madhumalati.

A large woody climbing shrub growing near water courses and moist places; abundant in the Western ghats, Konkan, Deccan, Kanara.

Leaves are eaten by cattle.

*See*—Medicinal Plants.

## HOLARRHENA ANTIDYSENTERICA Wall.

FAM.—Apocynaceæ.

COM. NS. :—*G.* Hath-kuda ; *H.* Kura ; *K.* Kudsalu ; *M.* Pandhara Kuda.

A small tree ; growing in the deciduous monsoon forests throughout the State ; ghats and hilly parts of the Konkan and the Deccan.

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Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers.

## HOLOPTELEA INTEGRIFOLIA Planch.

FAM.—Ulmaaceæ.

COM. NS. :—*H.* Kanju ; *K.* Tavisi ; *M.* Wavali.

A large spreading tree growing in deciduous forests throughout the State. Konkan (common), Deccan-Khandala.

Leaves are eaten by cattle.

*See*—Timbers.

## HOTOSTEMMA RHEEDIANUM Spreng.

FAM.—Aselepiadaceæ.

COM. NS. :—*M.* Tultuli.

A large climbing shrub growing in hedges in the moist forests of the Konkan and N. Kanara.

All parts of the plant are eaten by cattle.

*See*—Fibres.

## HYMENODICTYON EXCELSUM Wall.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Dendra ; *H.* Bandaru ; *K.* Doti ; *M.* Bhorsal.

A large deciduous tree growing in deciduous monsoon forests ; sometimes along river banks ; throughout the Konkan and Deccan ghats.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers.

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### INDIGOFERA PULCHELLA Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Chimnati.

A large shrub growing in Konkan and N. Kanara from the sea-level upwards; also in the moist forests along the ghats.

Leaves are eaten by cattle.

### IXORA PARVIFLORA Vahl.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Makrikighar; *K.* Korgi; *M.* Rai-kuda.

A small evergreen handsome tree growing throughout the State in deciduous forests. Konkan, Matheran, Khandala.

Leaves are eaten by buffaloes.

*See*—Timbers, Ornamental Plants.

### KYDIA CALYCINA Roxb.

FAM.—Malvaceæ.

COM. NS. :—*H.* Patari; *K.* Lolebende; *M.* Ranbhendy, Warang.

A small or moderate-sized tree; common in the deciduous forests on the Konkan and N. Kanara ghats; also found on dry Deccan hills of the Poona district.

Leaves are eaten by buffaloes.

*See*—Timbers, Fibres.

### LAGERSTRŒMIA SPECIOSA Pers.

FAM.—Lythraceæ.

COM. NS. :—*H.* Tarul; *K.* Holematti; *M.* Nava, Taman.

A large deciduous tree growing in southern Konkan and N. Kanara ghats along the banks of nalas and rivers; sometimes planted as an ornamental tree.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers.

### LAGERSTROEMIA PARVIFLORA Linn.

FAM.—Lythraceæ.

COM. NS. :—G. Kakria; H. Lendya; K. Cheminge; M. Bondara.

A large tree growing throughout the State in deciduous forests from the coast in-land.

Leaves are eaten by buffaloes.

*See*—Timbers Fibres, Dyes and Tans, Gums and Resins.

## LANNEA GRANDIS Engl.

## (ODINA WODIER Roxb.)

FAM.—Anacardiaceæ.

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COM. NS. :—*H.* Kimul; *K.* Gojal; *M.* Shimti.

A moderate-sized or large deciduous tree; common throughout the State in deciduous forests.

Leaves and branches are eaten by cattle.

*See*—Timbers, Dyes and Tans, Gums and Resins.

## LEUCAENA GLAUCA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Ku babhul.

A large erect shrub or a small tree. A native of Tropical America, naturalised in the State; found from coast inland; also planted in gardens.

Leaves are eaten by cattle.

## MADHUKA LONGIFOLIA Mecbr.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Honnage, Pokka; *M.* Mowda.

A large deciduous tree; common in the deciduous forests throughout the State; also in Konkan and N. Kanara (rare); often cultivated and self-sown near villages.

Leaves, flowers and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins, Famine Plants, Liquors.

## MADHUKA INDICA Gmel.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Hunage, Pokka; *M.* Moha, Mhowra.

A large tree; common in the dry forests throughout the State; also planted as road-side tree.

Leaves, flowers and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Poisonous Plants and Fish Poisons, Liquors.

### MADHUKA LONGIFOLIA Mesh.

### MALLOTUS PHILIPPINENSIS Muell.

FAM.—Euphorbiaceæ.

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COM. NS. :—*G.* Kapilo; *H.* Kamala; *K.* Kesarimava; *M.* Shendri.

A small evergreen tree growing throughout the State in monsoon in open thorn forests; more common in the Konkan jungles and hills.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans.

### MANGIFERA INDICA Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Ambo; *H.* Aam; *K.* Mavin-mara; *M.* Amba.

A large evergreen tree; common everywhere in the State; wild and cultivated.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins. Fruit Trees, Sacred Plants.

### MARSEDENIA VOLUBILIS T. Cooke.

FAM.—Asclepiadaceæ.

COM. NS. :—*M.* Harandodi.

A tall climber; common in the hedges throughout the State.

Leaves are eaten by sheep and goats.

*See*—Medicinal Plants.

### MELIA AZADIRACHTA Linn.

FAM.—Meliaceæ.

COM. NS. :—*G.* Limbada; *H.* Nim; *K.* Nimba; *M.* Kadulimb.

A moderate sized to a large tree; growing throughout in dry regions; usually planted along roadside; also self-sown.

Leaves are eaten by sheep and goats.

*See*—Medicinal Plants, Timbers, Fibres, Oils, Famine Plants, Sacred Plants.

## MIMUSOPS HEXANDRA Roxb.

FAM.—Saoptaceæ.

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COM. NS. :—*G.* Rayan ; *H.* Khirni ; *M.* Khirni.

A large evergreen ornamental tree ; common in the dry forests of the Deccan, Khandesh and Gujarat.

Leaves are eaten by buffaloes.

*See*—Timbers, Oils, Fruit Trees.

## MORINDA CITRIFOLIA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Al ; *H.* Al : *K.* Ainshi ; M. Bartondi.

A small tree ; common along the coasts of the Konkan, quite near the sea ; cultivated especially in Khandesh and near Pandharpur.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Famine Plants.

## MORINDA TINCTORIA Roxb.

FAM.—Rubiaceæ.

COM. NS. :—G. Alleri ; H. Al ; K. Mulgul ; M. Al, Ainshi.

A tall shrub or a small tree ; growing in dry forests of the Deccan and Kanara.

Leaves are eaten by cattle.

*See*—Timbers.

## MORUS INDICA Linn.

FAM.—Moraceæ.

COM. NS. :—*G.* Shetur ; *H.* Shetur ; *K.* Karihannu ; *M.* Tut.

A deciduous shrub or a small tree. Wild and cultivated ; common about villages in N. Kanara.

Leaves are eaten by cattle. The leaves form the food of mulberry silk-worms.

*See*—Medicinal Plants, Timbers, Fibres.

### NYCTANTHES ARBOR-TRISTIS Linn.

FAM.—Oleaceæ.

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COM. NS. :—*G.* Jayaparvati; *H.* Har-singhar; *K.* Parijata; *M.* Parijatak.

A large shrub or a small tree; widely cultivated in gardens all over the State; found wild in the Satpuda forests in Khandesh.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Oils, Dyes and Tans, Sacred Plants, Ornamental Plants.

### OCHNA SQUARROSA Linn.

FAM.—Ochanaceæ.

COM. NS. :—*K.* Narole; *M.* Kanak-champa.

A handsome large shrub or a small tree; common in the moist forests of the Konkan and N. Kanara on the hills.

Leaves are eaten by buffaloes.

*See*—Timbers.

### OPUNTIA NIGRICANS Haw.

FAM.—Cactaceæ.

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COM. NS. :—*G.* Chorhothalo; *H.* Hathathoria; *K.* Mullugalli; *M.* Phadya-nivadung.

A woody shrub growing all over the State near villages and waste places; common in waste places. Chopped plants (after removing prickles by burning) are eaten by cattle.

*See*—Medicinal Plants, Fibres.

### OPUNTIA FICUS-INDICA (Linn) Miller.

FAM.—Cactaceæ.

COM. NS. :—*E.* Spinless cactus; *M.* Bin-katyacha nivdung.

A woody shrub without prickles; native of Tropical America. Introduced and sparingly cultivated in the State as a forage plant.

Chopped Plants are fed to cattle.

## OUGEINIA DALBERGIOIDES Benth.

FAM.—Papilionaceæ.

COM. NS. :—*H.* Sandan; *K.* Betta-honne; *M.* Tiwas.

A moderate-sized tree growing throughout the State in deciduous forests.

Branches are eaten by cattle.

*See*—Timbers, Fibres, Gums and Resins, Poisonous Plants and Fish Poisons.

## PAVETTA INDICA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*K.* Pavati; *M.* Papat.

A stout bushy shrub; common throughout the State.

Leaves are eaten by buffaloes.

*See*—Medicinal Plants, Fruit Trees.

## PITHECOLOBIUM DULCE Benth.

FAM.—Mimosaceæ.

COM. NS. :—*H.* Dakhani-babul; Vilayati-amli; *M.* Vilayati-chinch.

A moderately large evergreen tree; a native of Mexico, introduced into India; cultivated often as a hedge plant in the State, especially in Bombay and Poona.

Pods are eaten by cattle.

*See*—Timbers, Oils.

## PITHECOLOBIUM SAMAN Linn.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Rain-tree; *M.* Saman.

A large tree, native of America, planted along road-side, in some places in the State.

Pods are eaten by cattle.

## PROSOPIS JULIFLORA D. C.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Algaroba.

A thorny large shrub growing in dry regions; native of dry regions in Central America. Introduced and cultivated sparingly in the State.

The leaves, shoots and pods (which are sweetish) are eaten by animals. Pods are said to be nutritious.

## PROSOPIS SPICIGERA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Samru; *H.* Chaunkra; *K.* Banni; *M.* Saunder, Shami.

A moderate-sized deciduous thorny tree; growing in the dry forests of the Deccan and Gujarat.

Leaves and pods are eaten by sheep and goats.

*See*—Timbers, Gums and Resins, Sacred Plants.

## PTEROCARPUS MARSUPIUM Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Bibla; *H.* Bija; *K.* Bibla; *M.* Bibla.

A large tree; growing throughout the State in deciduous monsoon forests; common in Konkan and N. Kanara.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## PUERARIA TUBEROSA D. C.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Karwi-bai; *H.* Bedari-kand; *M.* Dari.

A large twining shrub, roots tuberous; growing throughout Konkan and N. Kanara in open jungles; also in Dangs.

Leaves are eaten by cattle.

*See*—Gums and Resins.

## PUTRANJIVA ROXBURGHII Wall.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Jaiput, Putijiya; *K.* Putra-jivi; *M.* Jiwan-putra, Putranjiva.

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An evergreen tree with bending branches growing in the evergreen forests of the Konkan and N. Kanara; Kanheri and Alibag jungles; sometimes planted.

Leaves are eaten by cattle.

*See*—Timbers, Oils, Sacred Plants.

## RANDIA DUMETORUM Lamk.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Midhola; *H.* Mainphal; *K.* Kangrikai; *M.* Gela.

A small tree; common throughout the State in deciduous monsoon and dry forests.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fruit Trees, Poisonous Plants and Fish Poisons.

## RANDIA ULIGINOSA D. C.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Kausia; *H.* Bharani; *K.* Pendri; *M.* Pindra.

A small tree; growing in deciduous forests of the State; often in abandoned rice fields.

Leaves are eaten by cattle.

*See*—Timbers, Fruit Trees (W).

## RHIZOPHORA MUCRONATA Lam.

FAM.—Rhizophoraceæ.

COM. NS. :—*M.* Kandal.

A small evergreen tree; common in the salt marches and muddy tidal flats along the coast of the State.

Leaves and fruits are eaten by cattle.

*See*—Timbers, Dyes and Tans.

## SALVADORA PERSICA Linn.

FAM.—Salvadoraceæ.

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COM. NS. :—*G.* Pilu, Piludi; *H.* Jhal, Pilu; *K.* Goni; *M.* Pilu.

A large much branched evergreen shrub or a small tree growing in saline soil near the coasts of Gujarat, Konkan and N. Kanara.

Young branches and leaves are a favourable fodder with camel.

*See*—Medicinal Plants, Timbers, Oils.

## SANTALUM ALBUM Linn.

FAM.—Santalaceæ.

COM. NS. :—*G.* Sukhad; *H.* Chandan; *K.* Agarugandh; *M.* Chandan.

A small evergreen tree, growing in dry deciduous and monsoon forests of the Deccan and N. Kanara.

Leaves are eaten by sheep and goats.

*See*—Medicinal Plants, Timbers, Oils, Famine Plants, Sacred Plants.

## SCHLEICHERA OLEOSA Merr.

FAM.—Sapindaceæ.

COM. NS. :—*G.* Kossama; *H.* Gausam; *K.* Hulimaya; *M.* Kasimb, Kusum.

A large beautiful deciduous tree; common throughout the State in both dry and moist mixed forests.

Twigs and leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Fruit Trees (w).

## SALIX TETRASPERMA Roxb.

FAM.—Salicaceæ.

COM. NS. :—*H.* Baishi; *K.* Nirangi; *M.* Walunj.

A moderate-sized deciduous tree; common on the river-banks and moist places at Mahabaleshwar (The Yenna river) in various places. Planted along road-side round about Belgaum, Konkan Ghats.

Leaves and branches are eaten by cattle.

*See*—Timbers.

## SALMALIA MALABARICA Schot. & Endle.

## (BOMBAX MALABARICUM D. C.)

FAM.—Malvaceæ.

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COM. NS. :—*G.* Sawar ; *H.* Semul ; *K.* Burla, Sauri ; *M.* Katesavari.

A very large prickly tree with straight trunk, growing throughout in the deciduous forests ; common in Gujarat, Konkan and S. M. Country.

Twigs and leaves are eaten by cattle.

*See*—Timbers, Fibres.

## SALVADORA OLEOIDES Dcne.

FAM.—Salvadoraceæ.

COM. NS. :—*G.* Khakananutela ; *H.* Jhal ; *M.* Khabbar, Pilu.

A large evergreen shrub or a small tree with a twisted or bent trunk; growing in dry places and saline soils ; apparently confined to Gujarat.

Branches are lopped off for camel fodder. Fruits are eaten by cattle.

*See*—Timbers, Oils, Fruit Trees (w).

## SMITHIA SENSITIVA Ait.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Kavla.

An annual diffuse, much-branched herb ; stems long slender ; leaves pinnate, leaflets 3-10 pairs, linear oblong hairy on the midrib and margins beneath ; flowers 2-6 in simple racemes, yellow ; pods flattened, 4-6 jointed hairy.

This is common in the State towards the close of the rains in grass lands and fields. Cattle cat the plant greedily.

*See*—Sacred Plants.

## SESBANIA ÆGYPTIACA Poir.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Rayasingami ; *H.* Rasin ; *K.* Jinangi ; *M.* Shewari.

A soft-wooded evergreen shrub or a small tree ; commonly cultivated in gardens throughout as a wind-break or support to betelvines.

Leaves are a good fodder for cattle.

*See*—Medicinal Plants, Timbers, Fibres, Famine Plants.

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## SESBANIA GRANDIFLORA Pers.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Agathio ; *H.* Austa ; *K.* Agase ; *M.* Agasta, Hadga.

A soft-wooded short-lived tree ; grown about temples and villages all over the State.

Leaves and young shoots are eaten by cattle.

*See*—Medicinal Plants, Timbers, Gums and Resins, Vegetables.

## SPODIAS MANGIFERA Pers.

FAM.—Anacardiaceæ.

COM. NS. :—*H.* Ambodha ; *K.* Avatekayi ; *M.* Ambada, Ran-amba.

A moderate-sized tree ; growing throughout the State usually in dry deciduous forests ; widely planted ; common in N. Kanara from the sea-coast inland.

Leaves and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers.

## STEPHEGYNE PARVIFLORA Korth.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Kallam ; *K.* Attaka ; *M.* Kadam.

A large deciduous tree ; growing throughout the State in deciduous forests ; Konkan and Mawal districts.

Leaves are eaten by cattle.

*See*—Fibres.

## STERCULIA COLORATA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*H.* Bodala ; *M.* Kowshy.

A moderate-sized deciduous tree ; growing throughout deciduous forests in the State.

Twigs and leaves are eaten by cattle.

*See*—Fibres.

## STERCULIA VILLOSA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*H.* Udal; *K.* Kalsoga; *M.* Parul, Sarda.

A moderate-sized tree; growing in deciduous forests from Gujarat to N. Kanara.

Leaves are eaten by cattle.

*See*—Timbers, Fibres.

## STEREOSPERMUM CHELONOIDES D. C.

FAM.—Bignoniaceæ.

COM. NS. :—*H.* Podal; *K.* Padiri, Puruli; *M.* Padal, Parul.

A large deciduous tree; growing throughout the Konkan and N. Kanara in evergreen as well as in deciduous moist forests.

Leaves are eaten by buffaloes.

*See*—Timbers.

## STEREOSPERMUM PERSONATUM Chatterji.

FAM.—Bignoniaceæ.

COM. NS. :—*H.* Parur; *K.* Hulave; *M.* Padal, Pahad.

A large tree; growing in the monsoon and deciduous forests in the State; common in the deciduous forests of Dharwar and in N. Kanara.

Leaves are eaten by buffaloes.

*See*—Medicinal Plants, Timbers.

## STREBLUS ASPER Lour.

FAM.—Urticaceæ.

COM. NS. :—*H.* Dabia, Sahora; *K.* Mittelgidda; *M.* Karvat, Kharoti.

A small evergreen tree; common throughout the State in dry open forests; also in evergreen forests of N. Kanara.

Leaves are eaten by cattle.

*See*—Timbers.

### KARVIA CALLOSU

### (STROBILANTHES CALLOSUS) Nees.

FAM.—Acanthaceæ.

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COM. NS. :—*K.* Gurgi; *M.* Karavi.

A large gregarious shrub; covers large areas in the Konkan and N. Kanara ghats; forms undergrowth in many moist deciduous forests.

Old leaves are eaten by cattle.

*See*—Poisonous Plants and Fish Poisons.

### SYZYGIUM CUMINI Skeel.

### Eugenia Jambolana Lan.

FAM.—Myrtaceæ.

COM. NS. :—*G.* Jambu; *H.* Jaman; *K.* Jambu, Neralu; *M.* Jambul.

A large evergreen tree; wild and cultivated; growing throughout the State along river banks and moist localities; common in hills of Nasik and Satara districts and Khandesh Akrani; also common in the moist forests of the Konkan and N. Kanara.

Leaves and fruits are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Sacred Plants.

### TECTONA GRANDIS Linn.

FAM.—Verbenaceæ.

COM. NS. :—*G.* Sag; *H.* Sagnean; *K.* Tegu; *M.* Sag.

A large tree; growing throughout the State in monsoon and mixed deciduous forests; abundant along the slopes of Western Ghats to the Mahi river in Gujarat; best teak forests are along river slopes in N. Kanara.

Young leaves and twigs are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

### TERMINALIA ARJUNA W. & A.

FAM.—Combretaceæ.

COM. NS. :—*G.* Arjun-sadado; *H.* Arjun, Koha; *K.* Bili-matti; *M.* Arjun-sadada.

A large deciduous tree, growing along the banks of rivers and streams throughout the State; very common in south Konkan and jungles south of Surat.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins.

## TERMINALIA BELERICA Roxb.

FAM.—Combretaceæ.

COM. NS. :—*G.* Bera ; *H.* Bahara ; *K.* Tara ; *M.* Behada.

A large deciduous tree ; common throughout the State, in deciduous mixed monsoon forests.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins.

## TERMINALIA CHEBULA Retz.

FAM.—Combretaceæ.

COM. NS. :—*G.* Hirdo ; *H.* Haria ; *K.* Barade ; *M.* Hirda.

A moderate-sized deciduous tree ; growing in moist parts of the Deccan on trap and common along ghats ; common in Khandesh Akrani ; monsoon forests of S. M. Country and N. Kanara.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## TERMINALIA TOMENTOSA W. & A.

FAM.—Combretaceæ.

COM. NS. :—*G.* Hadri ; *H.* Saj ; *K.* Kari-Matti ; *M.* Ain.

A large seasonal tree ; growing throughout the State in mixed deciduous forests ; common in the jungles at the foot of the Konkan Ghats.

Leaves are eaten by cattle.

*See*—Timbers, Dyes and Tans, Gums and Resins.

## THESPESIA MACROPHYLIA Blume.

FAM.—Malvaceæ.

COM. NS. :—*M.* Ran-bhendi.

A shrub ; very common along the Western Ghats ; common in the Konkan and N. Kanara forests from the sea-level upwards.

Leaves are eaten by cattle.

*See*—Fibres.

## THESPESIA POPULNEA Soland-ex. corr.

FAM.—Malvaceæ.

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COM. NS. :—*G.* Paraspiple ; *H.* Paraspipal ; *K.* Arasi ; *M.* Bhend.

A moderate-sized evergreen tree ; growing along the sea-shores of the Konkan and N. Kanara ; often cultivated as a road-side tree.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fibres, Oils, Sacred Plants.

## TOONA CILIATA Rœm.

FAM.—Meliaceæ.

COM. NS. :—*H.* Mahalimbu, Tun ; *K.* Tundu ; *M.* Deodari, Kurūk, Toon.

A large deciduous tree ; more or less abundant in the evergreen forests of the Konkan and N. Kanara ; ravines of Khandala.

Shoots, leaves and seeds are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins.

## TREWIA NUDIFLORA Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Pindara ; *K.* Kadu-kange ; *M.* Petari.

A moderate-sized or a large deciduous tree ; growing throughout Konkan and N. Kanara, in moist monsoon forests ; along *nalas* and in swampy localities.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Fruit Trees.

## VANGUERIA SPINOSA Roxb.

FAM.—Rubiaceæ.

COM. NS. :—*K.* Malla-kare ; *M.* Alu.

A large spiny shrub or a small tree ; common in the deciduous forests of N. Kanara, Konkan and Mawal.

Leaves are eaten by cattle.

*See*—Fruit Trees.

## VICOA AURICULATA Cass.

FAM.—Compositæ.

COM. NS. :—*M.* Sonekadi.

A slender erect, rigid leafy herb; growing on mal-lands and pastures in the Deccan districts.

The whole plant is eaten by cattle.

## VITEX LEUCOXYLON Linn.

FAM.—Verbenaceæ.

COM. NS. :—*K.* Hole-lakki; *M.* Shiras, Songarbi.

A large deciduous tree; growing throughout the Konkan and N. Kanara ghats, along the banks of rivers and nalas, and in moist forests.

Leaves are eaten by cattle.

*See*—Timbers.

## WOODFORDIA FRUTICOSA Kurz.

FAM.—Lythraceæ.

COM. NS. :—*G.* Dhavani; *H.* Dhawai; *K.* Bela; *M.* Dhayati.

A large deciduous straggling shrub; growing throughout the State in monsoon forests; on laterite at Mahabaleshwar, on trap in the Akrani.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Dyes and Tans, Ornamental Plants.

## WRIGHTIA TINCTORIA R. Br.

FAM.—Apocynaceæ.

COM. NS. :—*G.* Indrajav, Kali-kari; *H.* Indrajan, Khirai; *K.* Kuda; *M.* Kala-kuda.

A small seasonal tree, growing throughout the State in deciduous forests; common on the Toranmal plateau of W. Khandesh.

Leaves are eaten by cattle.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Sacred Plants.

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### XYLIA DOLABRIFORMIS Benth.

FAM.—Mimosaceæ.

COM. NS. :—*H.* Jambu ; *K.* Jambe ; *M.* Jambha, Yerul.

A large seasonal tree growing throughout the deciduous forests rather common from Kolaba to Savantwadi.

Leaves are eaten by cattle.

*See*—Timbers, Oils, Gums and Resins.

### ZIZYPHUS JUJUBA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*G.* Ber ; *H.* Ber ; *K.* Bogari ; *M.* Bor.

A small spiny sub-deciduous tree ; growing throughout the State in dry situations, in open dry forests, on poor soils and in rocky places ; abundant in the Deccan.

Leaves are eaten by cattle, sheep and goats.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Sacred Plants.

### ZIZYPHUS RUGOSA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*K.* Suna-boorli ; *M.* Toran.

A large thorny straggling or climbing shrub ; growing in open places throughout the State ; very common throughout the ghats of the State.

Leaves are eaten by cattle, sheep and goats.

*See*—Fruit Trees.

### ZIZYPHUS XYLOPYRA Willd.

FAM.—Rhamnaceæ.

COM. NS. :—*H.* Ket-ber ; *K.* Mulla-kare ; *M.* Ghot-bor.

A small tree ; common in the moist forests of Konkan and N. Kanara.

Young shoots, leaves and fruits are eaten by cattle.

*See*—Timbers, Dyes and Tans.

## SECTION 11–POISONOUS PLANTS AND FISH POISONS.

**SECTION 11.**

**Poisonous plants and Fish poisons.**

What is a poisonous plant? It is as difficult for a Botanist to answer this question as it is for a medico-jurist to define "a poison". Even the Indian Penal Code does not attempt to define "a poison" be it of vegetable, animal, mineral or any other origin.

Beck, one of the earliest of the standard writers on Medical Jurisprudence has attempted to define poison as follows :

Poisons are substances, which are known by the Physicians, as capable of altering or destroying in a majority of cases, some or all the functions necessary for life. They are such substances, as when exhibited in certain quantities of healthy or ordinarily constituted individuals, are capable of producing injuries or fatal effects in a more or less direct or certain way.

Plants exhibiting such qualities may be classed as poisonous. The term "poisonous plant" is used here in the widest possible sense and may be applied to plants which not only cause death but are also responsible for injurious effects on human beings or cattle.

The poison or noxious element may consist of an alkaloid or active principle and may exist in any or all different parts of plants — roots, stems, leaves (hairs or glands), flowers, fruits and seeds. The poisonous plants are more or less speedy in their action but they may not affect all alike.

### ABRUS PRECATORIUS Linn.

FAM.–Papilionaceæ.

COM. NS. :–*G.* Gunja ; *H.* Gunchi ; *K.* Gunja ; *M.* Gunja.

A deciduous twiner growing in moist and littoral forests throughout the State ; Common in Konkan and North Kanara.

Seeds contain *abrin* as a poisonous principle. Seeds eaten in large quantities act as an acrid poison. They are used by *chamars* for poisoning cattle. The seeds are powdered and made into little cylindrics called *sui.* A puncture is made in the skin of the animal and this sui is pushed in. The animal soon becomes uneasy and dies.

*See* Medicinal Plants, Famine Plants.

### ALANGIUM SALVIFOLIUM Wang.

FAM.–Alangiaceæ.

COM. NS. :–*G.* Ankola ; *H.* Akoly ; *K.* Ankotha ; *M.* Ankol.

A handsome tree, common throughout the State in dry places ; often along banks of nalas in Konkan and North Kanara.

The bark of the roots contains *alangin* as a poisonous principle. This bark is dangerously emetic followed by weakened action of the heart.

*See* Medicinal Plants, Timbers, Fruit Trees.

### ALBIZZIA PROCERA Benth.

FAM.—Mimosaceæ.

COM. NS. :—*H.* Safed-siris; *K.* Bellati; *M.* Kinhai.

A large deciduous tree growing throughout the State, common in the Konkan and North Kanara moist forests; along rivers and nalas in dry districts.

The bark, pounded and thrown into water, stupefies fish.

*See* Timbers, Dyes and Tans, Gums and Resins; Fodder Plants, Famine Plants.

### AMMANIA BACCIFERA Linn.

FAM.—Lythraceæ.

COM. NS. :—*G.* Talavgiyo; *H.* Dadmari; *M.* Bharanambhul, Jalmukhi.

An annual erect or subscandent herb, tolerably common in moist places all over the State.

The leaves are very acrid and are used by the natives to raise blisters. The fresh leaves bruised and applied to the skin produce a blister within half an hour. It appears that the juice of the leaves mixed with cooked food has been often used as a poison; it produces acute suffering with burning pain in the abdomen.

*See* Medicinal plants.

### AMORPHOPHALUS CAMPANULATUS Blume.

FAM.—Araceæ.

COM. NS. :—*G.* Suran; *H.* Suran; *K.* Suran; *M.* Suran.

A small tuberous herb. Cultivated and wild; cultivated widely in the State especially in the Deccan and Gujarat; grows wild on the banks of South Konkan rivers.

The tuber of Suran contains crystals of calcium oxalate and calcium carbonate. The cultivated variety contains crystals of calcium carbonate only, while the wild variety contains both. When tubers are eaten in food, these crystals cause irritation to the mucus membrane of the mouth, throat, tongue and digestive canal; sometimes there is a swelling of the tongue and salivation. Wild variety is more irritating than the cultivated one. This irritating property is partially or sometimes completely reduced by boiling tubers with salt and acid fruits.

*See* Medicinal Plants, Vegetables, Famine Plants.

### AMORPHOPHALUS COMMUTATUS Engler.

FAM.—Araceæ.

COM. NS. :—*M.* Shevle.

An annual tuberous herb; tuber oblate-spherical 10 by 5 cm., depressed above; leaf solitary, appearing a month after the flower, about 60 cm. in expansion, 3-sect with a stalk about 60 cm. long and variously spotted; spathe large; spadix robust; flowers male and female. When the anthers are ripe the odour of the plant is most offensive. The plant is very common at Matheran and in Thana jungles, also in Konkan.

The whole plant is acrid. It has never been used for criminal purposes, but when used for culinary purposes, it often irritates the mouth, and pharynx to an alarming extent; sometimes tongue becomes rapidly swollen. Long boiling before using the flower-stalks renders it harmless, but you can never know when the throat or the tongue may have to pay the penalty of even a moderate indulgence in this treacherous curry.

### ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Kaju; *H.* Kaju; *K.* Gerubi; *M.* Kaju.

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A small evergreen tree; very common near the sea-shore in open situations in Konkan and North Kanara, especially in sandy places; also planted.

The acrid oleo-resin, found in the middle layer of the pericarp of the fruit (nut) contains *cardol* (a colourless oil) and a fatty acid, anacardic acid; This oleo-resin causes vesicular irruptions, when it comes in contact with the skin, accompanied by swellings.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fruit Trees.

### ANAMIRTA COCCULUS W. & A.

FAM.—Menispermaceæ.

COM. NS. :—*G.* Kakaphal; *H.* Kakamari; *K.* Kakamari; *M.* Kakamari.

A shrub, climbing to a considerable height, found in moist rain forests in Konkan and North Kanara, Seeds possess powerfully poisonous properties due to the presence of *picrotoxin* and is chiefly used to poison fish, also used as cattle poison in Madras.

*See* Medicinal Plants.

### ANDROPOGON SORGHUM Brot.

FAM.—Gramineæ.

COM. NS. :—*G.* Jowar; *H.* Juar; *K.* Jola; *M.* Jwari, Jondhala.

Extensively grown annual crop of the Bombay State.

The plant is very poisonous to stock if fed in the earlier stages (before flowering), owing to the presence of prussic acid.

*See* Food Plants, Fodder Plants.

### ARISAEMA TORTUOSUM Schott & Edle.

FAM.—Araceæ.

COM. NS. :—*M.* Sapkanda.

A tall tuberous plant reaching about a meter high; tubers more or less spherical; leaves 2-3, palmately divided and cleft with stalks very long (30-90 cm.); sheath mottled; spadix one or two sexual; growing in Konkan and Western ghats.

The tubers of this plant and of allied species of Arisaema are poisonous and produce violent illness if eaten raw.

*See* Famine Plants.

### BALISOPERMUM MONTANUM Muell.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Danti; *K.* Danti; *M.* Danti.

A stout undershrub growing in dry open Deccan plains and in monsoon forests of North Kanara, abundant on the hills of Karanja in Konkan.

Seeds are poisonous and act as a very drastic purgative; in large doses they produce violent symptoms.

*See* Medicinal Plants.

### BARRINGTONIA ACUTANGULA Gaertn.

FAM.—Lecythidaceæ.

COM. NS. :—*G.* Samudraphal; *H.* Samudraphal; *K.* Holekanna; *M.* Samudraphal.

A moderate-sized tree growing in swampy places; along banks of rivers and streams throughout Konkan and North Kanara, common near the coast.

The bark is used to intoxicate fish.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fodder Plants.

### CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Akdo ; *H.* Ak ; *K.* Ekke ; *M.* Rui.

A large shrub with milky juice, growing throughout the State in dry waste places, very common.

The plant contains bitter resins *akundarin* and *calatropin.* The juice applied to the skin acts as an irritant, in large doses (when taken internally) it causes vomiting and purging acting as an emito-cathartic.

*See* Medicinal Plants, Fibres, Gums and Resins, Fodder Plants, Sacred Plants.

### CALOTROPIS PROCERA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*H.* Ak, Madar ; *M.* Mandara.

An erect shrub with milky juice, common in the dry parts of the State.

The juice of the plant applied to the skin acts an irritant, in large doses, it causes vomiting and purging.

*See* Medicinal Plants, Fibres, Gums and Resins, Fodder Plants.

### CANNABIS SATIVA Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Bhang ; *H.* Ganja ; *K.* Bhangi ; *M.* Bhang, Ganja.

A tall erect annual herb strongly smelling ; cultivated as a narcotic drug in some parts of the State.

The plant contains *Cannabinin* as an active principle. The leaves and flowering tops produce intoxicating effects.

*See* Medicinal Plants, Fibres, Oils, Narcotics.

### CASEARIA GRAVEOLENS Dalz.

FAM.—Samydaceæ.

COM. NS. :—*H.* Chilla ; *K.* Konje ; *M.* Bokhra.

A tall evergreen shrub or a small tree ; growing in open situations on the ghats, South Konkan, Mahableshwar, Matheran, Maval,

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Fruits are used for poisoning fish; infusion of leaves has poisonous effect on man.

*See* Timbers.

### CASEARIA TOMENTOSA Roxb.

FAM.—Samydaceæ.

COM. NS. :—*H.* Bhari, Chilla; *K.* Konja; *M.* Modi.

A small tree; growing throughout the State in deciduous forests, tolerably common; Konkan, Deccan hills, Southern Maratha Country.

The milky juice of the fruit is used for poisoning fish.

*See* Timbers.

### CERBERA ODOLLAM Gaertn.

FAM.—Apocynaceæ.

COM. NS. :—*K.* Honde; *M.* Sukanu.

A large evergreen shrub or a small tree; growing in salt-swamps of the South Konkan and North Kanara.

Kernel of the fruit is an irritant poison; green fruit is employed to kill dogs; nut is narcotic and poisonous.

*See* Medicinal Plants, Timbers, Fibres, Oils.

### CHROZOPHORA PLICATA A. Juss.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Okhrada; *H.* Shadevi; *M.* Suryavarta.

An annual erect hairy herb, growing in drier parts in the Deccan, Gujarat and Southern Maratha Country.

Roots cause blisters in contact with the skin.

*See* Fibres.

### CORALLOCARPUS EPIGAEUS C. B. Clarke.

FAM.—Cucurbitaceæ.

COM. NS. :—*M.* Kadvi-nai.

A prostrate or climbing annual herb with turnip-shaped root, found in Deccan, Gujarat and Southern Maratha Country.

The root, which contains *bryonin* as bitter principle, is a powerful irritant of the entire alimentary canal, causing inflammation of the intestines and dangerous vomiting.

## CROTON TIGLIUM Linn.

FAM.—Euphorbiaceæ.

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COM. NS. :—*G.* Nepal; *H.* Jamalgota; *K.* Danti, Japala; *M.* Jamelgota.

A small evergreen tree naturalised in South Konkan; also cultivated.

The seeds and their oil are well known as powerful cathartics; cases have, however, been recorded where their use in larger quantities, either criminally or unintentionally have produced death from excessive purging. The oil applied externally produces vesicular eruptions.

*See* Medicinal Plants, Oils.

## CUCUMIS TRIGONUS Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Kothiban; *H.* Hislambi; *M.* Karit.

An annual and perennial succulent creeper trailing along the ground or over hedges; the plant grows wild in the Konkan; also common in the jungles in the Deccan.

The fruit, which is fleshy and bitter, is a drastic irritant purgative; it is also abortifacient.

*See* Medicinal Plants.

## DATURA FASTUOSA Linn.

FAM.—Solanaceæ.

COM. NS. :—*G.* Kala-dhatura; *H.* Kala-dhattura; *K.* Dhattura; *M.* Kala-dhotara.

An annual shrub; very common in rubbish heaps and waste places throughout the State; found sometimes cultivated in gardens also. There are two varieties—Kala dhatura and safed dhatura.

Seeds contain alkaloids *hyoscine, hyoscyamine* and traces of *atropine.*

Seeds are a favourite poison for criminal purposes. The seed after being pounded is mixed with food and used by thieves to deprive their victims of the power of resistance. The poison causes a sort of temporary insanity, during which the sufferer does not know what passes before his eyes. The poison causes wild delirim, rapid pulse and increased frequency of respiration.

*See* Medicinal Plants, Ornamental Plants.

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## ELAEODENDRON GLAUCUM Pers.

FAM.—Celastraceæ.

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COM. NS. :—*G.* Alan ; *H.* Bakra ; *K.* Mukariki ; *M.* Aran, Tamruj.

A small tree (grows sometimes to a great height) ; growing throughout the State in deciduous forests ; also in the ghats of Southern Maratha Country and North Kanara.

The bark is said to be a virulent poison —(Brand)

*See* Timbers, Gums and Resins, Fodder Plants.

## EUPHORBIA TIRUCALLI Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Dandalio Thor ; *H.* Sahud ; *K.* Bottugalli ; *M.* Sher.

A small tree with milky juice cultivated as a hedge plant all over the State, especially in dry districts.

The acrid juice, when it comes in contact with the skin, causes vesicular eruptions. It also causes vomiting and purging if taken internally. It is used as a fish poison.

*See* Medicinal Plants, Timbers, Gums and Resins.

## GLORIOSA SUPERBA Linn.

FAM.—Liliaceæ.

COM. NS. :—*G.* Dudhio-vachhanag ; *H.* Kalihari ; *K.* Huliyuguru ; *M.* Kallavi, Khadyanag.

A herbaceous tall climber ; common in forests and in low jungles throughout the State ; common below ghats in jungles on Konkan side ; planted in gardens as an ornamental plant because of its beautiful flowers.

The root contains alkloids *gloriosin* and *superbin.* The plant is one of the nine secondary poisons mentioned by Hindu writers. The root is not so poisonous as is supposed to be ; but there have been cases in which excessive doses had caused virulent vomiting, spasms and racking pain.

*See* Medicinal Plants.

## GNETUM ULA Roxb.

FAM.—Gnetaceæ.

COM. NS. :—*K.* Kodkan-balli ; *M.* Kumbal.

A lofty climber, growing throughout the moist forests of the Konkan and North Kanara ghats.

Leaves are said to be used to poison fish in the Konkan.

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### HURA CREPITANS Linn.

Fam.—Euphorbiaceæ.

COM. NS. :—*E.* Sand-box tree.

A branching shady tree; a native of Tropical America has been planted at Poona and Khandala. It has glossy leaves and reddish inconspicuous flowers. The curious round hard shelled fruit is about the size of an orange and when ripe often bursts with great force and with a noise like the report of a pistol.

The plant abounds in a poisonous milky juice which is said to cause blindness if applied to the eyes. The seeds are possessed of violent cathartic properties and there are on record cases in which one or two seeds administered in the form of an emulsion nearly proved fatal.

### HYDNOCARPUS LAURIFOLIA Denn.

Fam.—Flacourtiaceæ.

COM. NS. :—*K.* Bhutabi; *M.* Kadu-kawat.

A large evergreen tree; endemic from Konkan southwards, common in North Kanara evergreen forests.

Fruits are used for poisoning fish.

*See* Medicinal Plants, Timbers, Oils.

### IPOMOEA BATATAS Linn.

Fam.—Convolvulaceæ.

COM. NS. :—*G.* Sakeria; *H.* Sakarkand; *K.* Genasu; *M.* Ratalu.

A trailing plant with tuberous roots; a native of America. Cultivated as a garden crop in the State.

The leaves are said to cause vomiting and purging.

*See* Vegetables.

### JATROPHA CURCAS Linn.

Fam.—Euphorbiaceæ.

COM. NS. :—*G.* Ratanjot; *H.* Jangli-erand; *K.* Dundigu; *M.* Mogali-erand.

A large deciduous soft wooded shrub; commonly grown as a fence round the gardens and fields in the State.

The seeds with embryo, which contain active principle *curcin,* act as a drastic purgative.

*See* Medicinal Plants, Oils.

### JATROPHA MULTIFIDA Linn.

FAM.—Euphorbiaceæ.

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COM. NS. :—*E.* Coral plant; *K.* Vilayati haralu.

A handsome garden shrub cultivated in gardens all over the State as an ornamental plant; a native of North America.

The seeds are an even more powerful purgative than the preceding. A case has been recorded where only three seeds taken, caused violent vomiting and purging, intense pain and heat in the stomach with great prostration following, though the patient recovered under treatment. Oil is used both internally and externally as an abortifacient.

*See* Medicinal Plants, Ornamental Plants.

### KAEMPFERIA ROTUNDA Linn.

FAM.—Zinjiberaceæ.

COM. NS. :—*G.* Bhui-champo; *H.* Bhui-champa; *K.* Nelasampige; *M.* Bhui-Chapha.

A stemless plant with tuberous root-stock cultivated in the State, but not indigenous.

The internal administration of the juice of the tuber causes profuse salivation and subsequent vomiting or retching.

*See* Medicinal Plants.

### KALANCHOE SPATHULATA D. C.

FAM.—Crassulaceæ.

COM. NS. :—Panphuti.

A stout perennial herb with yellow flowers and fleshy leaves; found at Panchgani in the Deccan and Badami in the Southern Maratha Country.

Leaf-juice of the bitter variety acts as purgative; poisonous to goats and cattle.

### LAGENANDRA TOXICARIA Dalz.

FAM.—Araceæ.

COM. NS. :—*M.* Vatsanabh.

An aquatic herb with thick creeping root-stock, leaves large from 15-38 cm. long and 1-8 cm. broad; inflorescence male cylindric, female globose. *Fl. t.*—Feb.-Mar.

The fresh tubers, if eaten act as an acrid-poison and cause violent illness. When boiled and cooked they loose their poisonous properties by the acrid principle being either destroyed or removed in the process.

*See* Medicinal Plants.

### LAGENARIA LEUCANTHA Rusby.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Dudhi ; *K.* Halagumbala ; *M.* Dudhya-bhopala.

A climbing plant, both wild and cultivated, usually grown in garden lands.

The bitter variety called kadu-bhopala has a fruit with bitter pulp. It acts as a drastic purgative.

*See* Medicinal Plants, Vegetables.

### LASIOSIPHON ERIOCEPHALUS Dene.

FAM.—Thymelacaceæ.

COM. NS. :—*K.* Kukurgal ; *M.* Rametha.

A much-branched large shrub ; found growing in monsoon forests ; Konkan southwards. Common at Mahabaleshwar, Deccan hills.

The leaves are said to be acrid and poisonous. The bark is used to poison fish.

*See* Medicinal Plants, Timbers, Fibres.

### LOBELIA NICOTIANAEFOLIA Heyne.

FAM.—Lobeliaceæ.

COM. NS. :—*G.* Nali ; *H.* Narsala ; *K.* Kalahogesoppu ; *M.* Dhaval.

A very large biennial or perennial herb found growing in western ghats, Konkan, Deccan.

The plant contains the alkaloid *lobelin.* The leaves and seeds are acidic and poisonous. Dry herb and seeds irritate throat and nostrils ; acts like *Dhatura.*

*See* Medicinal Plants, Narcotics.

### LATHYRUS SATIVUS Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Lang ; *H.* Khesari ; *M.* Lakh.

A procumbent annual plant, extensively cultivated in Gujarat, grown in Nasik district also.

The oil from the seeds is a powerful, but dangerous cathartic. Consumption of large quantities causes a paralysis. The disease is called "Lathyrism".

*See* Medicinal Plants, Food Plants, Fodder Plants.

### MADHUKA INDICA Gmel.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Hunage, Pokka; *M.* Moha, Mhowra.

A large tree; common in the dry forests throughout the State; also planted as roadside tree.

The oil cake, which remains after extraction of the oil from the seeds, is used for poisoning fish.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fodder Plants, Liquors.

### MAESA INDICA Roxb.

FAM.—Myrsineæ.

COM. NS. :—*K.* Gudde-hurgi; *M.* Atki.

A small or large shrub; growing in forests of the Konkan and North Kanara ghats. In Kanara leaves are used to poison fish.

### MANIHOT UTILISSIMA Pohl.

FAM.—Euphorbiaceæ.

COM. NS. :—*E.* Cassava, Tapioca; *M.* Lakdi-ratalu.,

A shrubby perennial 15-18 cm. high, with erect stems, palmately divided leaves on long stalks, and large fleshy tuberous roots. It is a native of Tropical America cultivated in gardens in the State.

The juice of the root, which contains hydrocyanic or prussic acid, produces convulsions. When the roots are grated and washed, boiled or roasted the poison is dissipated.

### MELOTHRIA MADERASPATANA Cogn.

FAM.—Cucurbitaceæ.

COM. NS. :—*M.* Chirati, Ghugri.

Annual hairy herb; stem scandent or prostrate; fruit, the size of a pea, at first green and variegated with yellow, finally wholly red; seeds ellipsoid, compressed, rough on both surfaces. Very common in hedges practically all over the State.

The seeds are said to be poisonous.

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### MIMUSOPS ELENGI Linn.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Baphuli; *H.* Bakul; *K.* Bakul; *M.* Bakul.

A large evergreen tree with fragrant small flowers. Common in the evergreen forests of the Konkan and North Kanara; often planted in gardens.

The bark though used medicinally for relieving tooth-ache, sometimes produces dropsical swelling (Oedema) of the uvula and the mucus membrane of the whole mouth, and the incessant flow of saliva for a couple of hours.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fruit Trees, Ornamental Plants.

### MORINGA OLEIFERA Lam.

FAM.—Moringaceæ.

COM. NS. :—*G.* Sargavo; *H.* Sajina; *K.* Guggala; *M.* Shevaga.

A fairly large deciduous tree; growing wild in sub-Himalayan tract, cultivated in fields and gardens all over the State.

The bark is abortifacient. Paste of powdered bark taken internally or applied externally causes abortion.

*See* Medicinally Plants, Timbers, Fibers, Oils, Gums and Resins, Vegetables.

### MUNDULEA SUBEROSA Benth.

FAM.—Papilionaceæ.

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COM. NS. :—*K.* Min-bundati; *M.* Supti.

A small tree, very ornamental when in flower, growing in dry forests of the Western Peninsula, Konkan, Deccan.

The seeds are used for poisoning fish.

*See* Timbers.

### NERIUM ODORUM Soland.

FAM.—Apocynaceæ.

COM. NS. :—*G.* Kaner; *H.* Kaner; *K.* Kamgile; *M.* Kanher.

A large evergreen shrub with milky juice; grows wild by the banks of rivers in the Deccan — Khandesh and Nasik districts; planted in gardens throughout; also as a hedge plant.

All the ancient and modern Hindu writers agree in ascribing poisonous properties to this plant. The stem, root, leaves and flowers are all more or less very deadly, the bark of the root being especially so. This contains active principles – *Rosaginin*, *Neriodorein* and *Neriodorin*, *Oleandrine*, *Nerianthin*, *Nerin*. The poison directly depresses the nervous system, acts as a cardiac poison, and sometimes well-marked tetanic symptoms are also exhibited.

*See* Medicinal Plants, Sacred Plants, Ornamental Plants.

### OUGEINIA DALBERGIOIDES Benth.

FAM.–Papilionaceæ.

COM. NS. :–*H.* Sandan ; *K.* Betta-honne ; *M.* Tiwas.

A moderate-sized deciduous tree, growing throughout the State in deciduous forests.

The pounded bark of the tree is used for poisoning fish.

*See* Timbers, Fibres, Gums and Resins, Fodder Plants.

### PASPALUM SCROBICULATUM Linn.

FAM.–Gramineæ.

COM. NS. :–*G.* Kodra ; *H.* Kodra ; *K.* Haraka ; *M.* Kodra.

An annual grass cultivated in the State as a kharif crop for its grains. The most important centre of cultivation is Gujarat.

The newly harvested grain is said to be powerfully narcotic. The husk of the grain produces unconsciousness, delerium with violent tremors, weak pulse.

*See* Food Plants, Narcotics.

### PHASEOLUS VULGARIS Linn.

FAM.–Papilionaceæ.

COM. NS. :–*E.* French bean ; *G.* Phanasi ; *K.* Tingalvari ; *M.* Shravan-ghevda.

A herbaceous twining plant cultivated throughout the year, all over the State for its green pods.

*Shravan-ghevda* is known to serve as an excellent vegetable but the root of this plant when eaten is poisonous causing giddiness and sickness.

A case has been recorded by Mr. Barlett, in Pharmaceutical Journal Vol. II, page 721, 1842-43, regarding the poisonous effects of the root.

*See* Vegetables.

### PLUMBAGO ROSEA Linn.

FAM.—Plumbaginaceæ.

COM. NS. :—*G.* Lal-chitrak ; *H.* Lalchita ; *K.* Kempuchitramula ; *M.* Lal-Chitrak.

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A small shrub with rosy scarlet flowers ; cultivated as an ornamental plant all over the State ; found wild in Southern Konkan.

The root of the plant is most obnoxious. It contains the active principle *plumbagin.* Root-bark paste is very irritant and raises blisters when applied externally. When taken internally in small doses it acts as a stimulant but if taken in large doses acts as an acronarcotic poison. It is criminally used in procuring abortion, the scraped root-bark being introduced for this purpose into the *OS uteri.*

*See* Medicinal Plants, Ornamental Plants.

### PLUMBAGO ZEYLANICA Linn.

FAM.—Plumbaginaceæ.

COM. NS. :—*G.* Chitrak ; *H.* Chitra ; *K.* Chitra-mula ; *M.* Chitrak.

A perennial subscandant herb with white flowers ; grows in rocky and shady places ; planted in gardens as an ornamental plant.

The root, which contains *plumbagin* as active principle, is a powerful poison and its internal use is said to be attended with great danger. Its actions are same as *Plumbago rosea* root.

*See* Medicinal Plants, Ornamental Plants.

### RANDIA DUMETORUM Lamk.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Midhola ; *H.* Mainphal ; *K.* Mangrikai ; *M.* Gela.

A small deciduous tree ; common throughout the State in deciduous monsoon and dry forests.

Pounded bark is used for poisoning fish.

*See* Medicinal Plants, Timbers, Fruit Trees, Fodder Plants.

### RICINUS COMMUNIS Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Divaligo ; *H.* Erand ; *K.* Eranda ; *M.* Erand.

A small annual or perennial bush generally cultivated all over the State, extensively grown in Gujarat.

Seeds contain a toxic substance called *ricin*. The whole seed is a powerful poison causing violent irritation of stomach and bowels.

*See* Medicinal Plants, Fibres, Oils.

### SAPINDUS LAURIFOLIUS Vahl.
### (SAPINDUS TRIFOLIATUS. Linn.)

FAM.—Sapindaceæ.

COM. NS. :—*G.* Aritha ; *H.* Ritha ; *K.* Antharalo, Kugale ; *M.* Ritha.

A large handsom tree growing along the Western ghats from Konkan southwards to North Kanara ghats in evergreen monsoon forests, often planted.

The fruits and the soapy water are used to poison fish.

*See* Medicinal Plants, Timbers, Oils, Ornamental Plants.

### SAPIUM INSIGNE Trim.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Linda ; *K.* Nanaka ; *M.* Dudla.

A middle-sized deciduous tree ; common near the coast of the Konkan and North Kanara, on dry rocky soil ; also in moist forests of the ghats.

The thick milky juice of the plant produces vesications on the skin.

*See* Medicinal Plants, Timbers.

### SECURINGEGA VIROSA Pax. & Hoff.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Shaunavi ; *H.* Patala , *K.* Belahuli ; *M.* Pandharphali.

A large shrub or a very small tree ; growing throughout the State in deciduous forests.

The plant contains an alkaloid. The plant is employed to intoxicate fish.

*See* Medicinal Plants, Timbers.

### SEMECARPUS ANACARDIUM Linn

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Bhilama ; *H.* Bhilava ; *K.* Gerkayi ; *M.* Biba.

A moderate-sized deciduous tree ; growing in deciduous dry forests throughout the State ; abundant in dry forests of Konkan, Deccan and Gujarat.

The pericarp of the nut is full of acrid juice which is a distinct vesicant of the skin. Some escape its action beyond a slight irritation where the nut is locally applied; others suffer from irritation of even untouched parts, while some others suffer violently even from a distance, though not themselves the users of the irritant fluid. The juice produces blisters and ulceration of the skin; in certain constitutions it is apt to produce eryscpelatous inflammation of the whole body, followed sometimes by death. Therefore the juice has to be used with great caution. The people of Gujarat and Saurashtra are more sensitive to its action and the people of fair complexion are very sensitive to its action.

The juice of the tree is so poisonous and acrid that the people are afraid of cutting it and they only do so after killing it by removing the bark. It is said that the disagreeable consequences often result by even sleeping under this tree.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins.

## STROBILANTHES CALLOSUS Nees.

FAM. :—Acanthaceæ.

COM. NS. :—*K.* Gurgi; *M.* Karavi.

A large gregarious shrub; covers large areas in the Konkan and North Kanara Ghats; forms undergrowth in many moist deciduous forests.

The fresh leaves are occasionally used by the rural classes as a general tonic, antifrebric and antiperiodic remedy in malarial fevers. The use of the fresh leaves for this purpose have sometimes caused irritation of the stomach and produced severe vomiting followed by symptoms of gastritis. The inflammation of the mucous membrane of the stomach thus produced is due to the mechanical-irritation caused by the hair on the leaves. It is when the leaves are quite fresh and the minute hair stiff and erect with the liquid contents of their cells intact, that their irritative potency is most active (Kirtikar).

*See*—Fodder Plants.

## STRYCHNOS COLUBRINA Linn.

FAM. :—Loganiaceæ.

COM. NS. :—*M.* Kajra-vel.

A large woody climber growing in Konkan, Matheran, ravines of Khandala, Southern Maratha Country, in Kanara forests of Tinai Ghat.

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—
**Poisonous plants and Fish poisons.**

The wood and root contain strychnin. The fruit is said to be poisonous.

### STRYCHUOS NUX-VOMICA Linn.

FAM.—Loganiaceæ.

COM. NS. :—*G.* Kuchala ; *H.* Kajra ; .*K.* Kajavara ; .*M.* Kajra ; Kuchla.

A large spiny deciduous tree, growing in moist monsoon forests, very common in Konkan and North Kanara ; abundant on laterite along sea-coast.

Nux-vomica is well known for its poisonous properties, *Strychnin*, the chief active principle of this plant, is one of the most powerful poisons acting on the nervous and the muscular systems. It causes tetanus (toxic contractions of all voluntary muscles). It has a marked effect on the blood ; the blood pressure rises ; there is arterial tension during the appearance of the convulsions and the pulse becomes slow.

*See* Medicinal Plants, Timbers, Oils.

### TERMINALIA BELERICA Roxb.

FAM.—Combretaceæ.

COM. NS. :—*G.* Bera ; *H.* Bahara ; *K.* Tara ; *M.* Behada.

A large deciduous tree ; common throughout the State in deciduous mixed monsoon forests.

The kernel of the seeds of Behada is narcotic in its action ; the narcotic symptoms are drowsiness, headache, sickness at stomach and free vomiting of a thick frothy mucus. Sometimes the effects are severe. The eating of kernels affects different individuals differently.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Fodder Plants.

### THEVETIA NERIOLIA Juss.

FAM.—Apoeynaceæ.

COM. NS. :—*G.* Pila-kaner ; *H.* Pila-kanir ; *M.* Pivali-kanher.

A large evergreen shrub with linear bright-green, shining leaves planted all over the State as an ornamental plant or hedge.

The plant contains *thevetin* and *theveresin* as active principles. These make the plant highly dangerous.

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Poisonous plants and Fish poisons.

Fruit and nut produce vomiting, clammy sweat and convulsions. Oil obtained from the seeds is considered to be a cardiac poison. The acrid-oil contained in the kernels is a powerful acro-narcotic poison allied to Nux-vomica, and its effects as a poison are very rapid.

*See* Medicinal Plants, Oils.

## TRICHOSANTHES CUCUMERINA Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Patola ; *.H.* Jangli-chinchoda ; *K.* Kiripodla ; M. Kadu-padval.

A scandent annual ; fruit oviod-fusiform, with a long, sharp beak, green with white stripes when raw, scarlet when ripe ; found growing in hedges all over ; more common in Gujrat.

The plant has an emetic effect. Juice of the plant produces vomiting. The juice of root in large doses acts as a drastic purgative. The leaves and fruit are all bitter and act equally powerfully.

*See* Medicinal Plants.

## TRICHOSANTHES PALMATA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :—G. Ratan in-drayan ; H. Lal indrayan ; K. Avagude hannu. M. Kaundal.

A large climber with a robust stem ; fruit round, red when ripe with 10 streaks ; growing wild in hilly parts of Konkan, Deccan and Southern Maratha Country.

The fruit-shell and the pulp are posionous. The pulp acts as a drastic purgative when taken internally. " mixed with rice it is used to destroy crows " (Auxburgh). The pulp is used for poisoning cattle " (Dr. Lyon.).

*See* Medicinal Plants.

## WALSURA PISCIDIA Roxb.

FAM.—Meliaceæ.

A moderate-sized tree, found in Southern Maratha Country and North Kanara Ghats in evergreen forests.

The fruit is oblong, dark-brown and the size of an olive ; the pulp of the fruit is used to intoxicate fish,

*See* Timbers.

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## SECTION 12—PLANTS YIELDING FERMENTED DRINKS (LIQUORS).

### ACACIA FERRUGINEA D. C.

FAM.—Mimosaceæ.

**SECTION 12.**

**Liquors.**

COM. NS. :—*G.* Khaiger; *K.* Banni; *M.* Pandhra khair.

A large decidous spiny tree, spines hooked; growing in the forests of Konkan, Dangs and Gujarat.

A spirit is distilled from the bark of this tree. At the time of distillation the bark is mixed with *Gur* (Jaggery).

*See* Timbers, Gums and Resins.

### ACACIA LEUCOPHIEA Willd.

FAM.—Mosaceæ.

COM. NS. :—*G.* Haribaval; *H.* Karir; *K.* Bili-jali; *M.* Hivar.

A moderate-sized or large deciduous spiny tree, spines straight. Grows throughout the Deccan districts, in dry open-forests.

A spirit is distilled from the bark of this tree, in the same way as above.

*See* Timbers, Fibres, Dyes and Tans, Gums and Resins.

### AGAVE AMERICANA Linn.

FAM.—Amaryllidaceæ.

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COM. NS. :—*E.* American aloe; *G.* Jungli-kuvar. *H.* Banskeora; *K.* Devabale; *M.* Ghayapat.

A stout shruby rhizomatous perennial, cultivated as an ornamental plant in gardens; planted also as a hedge plant.

A fine spirit is prepared in U. S. A. The juice is obtained by making incisions in the flower stalk or by removing the central cone of leaves and allowing the sap to collect in the cavity. It is a strong fiery drink, but not half as injurious as whisky.

*See* Medicinal Plants.

### ANACARDIUM OCCIDENTALE Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*E.* Cashew-apple; *G.* Kaju; *K.* Gerubi; *M.* Kaju;

An intoxicating beverage is obtained by distillation, from the fleshy receptacle. Large quantity of spirit is distilled in Goa and on the Malabar Coast.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fruit Trees, Poisonous Plants and Fish Poisons.

### ANAMIRTA COCCULUS W. & A.

FAM.—Menispermaceæ.

COM. NS. :—*E.* Crow-killer; *G.* Kakamari; *H.* Kakamari; K. Kakamari; M. Kakamari.

A shrub climbing to a considerable height, growing in the moist rain forests of the Kokan and North Kanara.

The seeds contained in the drupes (fruits) of this plant are used in Europe to adulterate beer. For this purpose the drupes were exported to various parts of Europe from the earliest times. They were also employed in Bombay to increase the intoxicating effects of country spirits sold in retail.

*See* Medicinal plants, Poisonous Plants and Fish Poisons.

### ANDROPOGON SORGHUM Brot.

FAM.—Gramineæ.

COM. NS. :—*E.* Great millet; *G.* Juwar; *H.* Juar; *K.* Jola; *M.* Jondhala, Jwari.

Extensively grown as an annual crop in the Bombay State for grain and fodder.

In Poona a country beer, called *bhoja,* is brewed from malted Jowari grain and *bhang* is added as a substitute for hops; this is drunk in large quantities, and is said to be a refreshing and innocuous drink. (Dalz. and Gibs. Bombay Flora.)

*See* Food Plants, Fodder Plants, Poisonous Plants and Fish Poisons.

### BORASSUS FLABELLIFER Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Palmyra Palm; *G.* Tad; *H.* Tad; *K.* Talimara; *M.* Tad.

A large erect palm tree with fan-shaped leaves; very common in the coastal districts of Kolaba and Thana; cultivated and self-sown.

The copious sap is obtained by tapping the spadix (inflorescence) which is fermented for 4-5 days and then distilled. It produces an intoxicating drink called *arrack.*

*See* Medicinal Plants, Timbers, Fibres, Gums and Resins, Fruit Trees, Sugars, Famine Plants.

### CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Akdo; *H.* Ak; *K.* Arka; *M.* Rui.

A large shrub with milky juice, common throughout the State in dry waste places,

**SECTION 12.**

**Liquors.**

The tribes of the Western ghats make an intoxicating drink, called *barr*, from the milk sap of this plant.

*See* Medicinal Plants, Fibres, Gums and Resins, Sacred Plants, Poisonous Plants and Fish Poisons, Fodder Plants.

### CARYOTA URENS Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Wild Sago-palm ; *G.* Shiva-jata ; *K.* Bagni ; *M.* Bherli mad.

A very handsome palm with cylindrical stem having flowers in pendulous branched spadix ; common in evergreen forests of the Konkan, N. Kanara, the Western ghats. Often planted in gardens.

The sap is obtained by tapping the inflorescence of the plant and when fermented becomes an intoxicating drink.

A single palm, it is estimated, is capable of giving an annual yield of about 180 gallons.

*See* Timbers, Fibres, Ornamental Plants.

### COCOS NUCIFERA Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Coconut Palm ; *G.* Narial ; *H.* Narial ; *K.* Tare ; *M.* Naral.

A tall palm cultivated throughout the State — extensively near the sea in Konkan and N. Kanara ; also cultivated inland.

The sweet juice is obtained by cutting the unopened spadix and collecting in various kinds of containers. It contains about 14 % sugar. When fresh (toddy or Neera) forms a pleasant drink ; when fermented and then distilled, it yields *arrack*, a strong alcohilic spirit. The extraction of toddy means, of course, the loss of the nut-crop.

*See* Medicinal Plants, Timbers, Oils, Fruit Trees.

### ELEUSINE COROCANA, Gaertn.

FAM.—Gramineæ.

COM. NS. :—*G.* Bavto ; *H.* Ragi ; *K.* Ragi ; *M.* Nachni, Nagli.

An annual grass cultivated in Konkan and on hill slopes in the Deccan and Karnatak for grain and fodder.

An intoxicating drink is brewed from the fermented grains.

*See* Medicinal Plants, Food Plants, Fodder Plants.

### MADHUKA INDICA, Gmel.

FAM.—Sapotaceæ,

**SECTION 12.**
**Liquors.**

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Hunnage, Pokka; *M.* Moha, Mowda.

A large tree, common in dry forests throughout the State; also planted as a roadside tree.

The well-known mowrah spirit is distilled from the flowers of this tree. The flowers are sweetish in taste.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Poisonous Plants, and Fish Poisons, Fodder Plants, Famine Plants.

### MADHUKA LONGIFOLIA Macbr.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Hounage, Pokka; *M.* Moha, Mowda.

A large deciduous tree, common in the deciduous forests throughout the State; also in Konkan and North Kanara (rare); often cultivated and self sown near villages.

The well known *mowrah* spirit is distilled from the flowers of this tree.

*See* Medicinal Plants, Timbers, Oils, Gums and Resins, Fodder Plants, Famine Plants.

### ORYZA SATIVA Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Rice; *G.* Dangar; *H.* Dhan; *K.* Bhatta; *M.* Bhat. Tandul.

It is one of the important food crops of the Bombay State, cultivated mainly in the heavy rainfall tracts in the State.

An intoxicating drink is brewed from the grains.

*See* Medicinal Plants, Food Plants.

SECTION 12.

Liquors.

### PHONIX SYLVESTRIS Roxb.

FAM.—Palmæ.

COM. NS. :—*E.* Wild date-palm ; *G.* Kujuri ; *H.* Khajuri ; *K.* Ichalamara ; *M.* Shindi.

A tall graceful palm with thick hemispherical crown ; wild or more often cultivated, in fairly good quantity in Surat, Sholapur and Poona districts, usually along banks and in beds of streams and water-courses.

Sap is extracted from a V-shaped cut made across the bared portion of the stem below the crown of leaves. When this sap is fermented and distilled it yields *arrack* an intoxicating drink. The fresh sap is sweet and forms a pleasant and wholesome drink. It is often called Neera.

*See* Medicinal Plants, Timbers, Fibres, Fruit Trees, Famine Plants.

### SACCHARUM OFFICINARUM Linn.

FAM.—Gramineæ.

COM. NS. :—*E.* Sugar-cane ; *G.* Sherdi ; *H.* Ganna ; *K.* Kabbu ; *M.* Oos.

A very tall perennial grass with juicy stem. Cultivated in many districts of the State for manufacturing *gul* and sugar.

A strong spirit is distilled from the juice especially in Goa.

*See* Medicinal Plans, Fibres, Sugars.

### SYZYGIUM GUMINI Skeel.

FAM.—Myrtaceæ.

COM. NS. :—*G.* Jambu ; *H.* Jaman ; *K.* Jambu, Neralu ; *M.* Jambul.

A large evergreen wild and cultivated tree, growing throughout the State along river banks and moist localities.

From the large sweet fruits, wine resembling *port* in taste and colour is manufactured especially in Goa. A spirit is also distilled for local use.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Fodder Plants, Sacred Plants.

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## SECTION 13–NARCOTIC PLANTS.

SECTION 13.

Narcotics.

### CANNABIS SATIVA Linn.

FAM.–Moraceæ.

COM. NS. :–*G.* Bhang ; *H.* Ganja ; *K.* Bhangi ; *M.* Bhang, Ganja.

A tall erect annual herb strongly smelling. Cultivated as a narcotic drug in some parts of the State.

The leaves and flowering tops of the female plants produce narcotic effects. The active principle is resinous in nature and contains three or four very powerful alkaloids. It is consumed in the form of *Chamas*, *Bhang* and *Ganja*.

*See* Medicinal Plants, Fibres, Oils, Poisonous Plants and Fish Poisons.

### DATURA FASTUOSA Linn.

FAM.–Solanaceæ.

COM. NS. :–*G.* Kala-dhatura ; *H.* Kala-dhatura ; *K.* Dhattura , *M.* Kala-dhotara.

An annual shrub ; very common in rubbish heaps and waste places throughout the State; found sometimes cultivated in gardens. There are two varieties – Kala-dhotara and Safed-dhotara.

Seeds which contain the alkaloids hyoscine and hyoscyamine produce narcotic effects such as temporary insanity.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons, Ornamental Plants.

### LOBELIA NICOTIANIFOLIA Heyn.

FAM.–Lobeliaceæ.

COM. NS. :–*G.* Nali ; *H.* Narsala ; *K.* Kalahoge-soppu ; *M.* Dhaval.

A very large biennial or perennial herb ; found growing in western ghats – Konkan, Deccan, Southern Maratha Country.

The plant contains alkaloid *lobeline.*

Leaves and seeds produce narcotic effects like Datura.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons.

### PASPALUM SCROBICULATUM Linn.

FAM.–Gramineæ.

COM. NS. :–*G.* Kodra ; *H.* Kodra ; *K.* Haraka ; *M.* Kodra.

An annual grass cultivated in the State (especially in Gujarat) as a *kharip* crop for its grain.

The newly harvested grain is said to be powerfully narcotic.

*See* Food Plants, Poisonous Plants and Fish Poisons.

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## SECTION 14–FAMINE PLANTS.

SECTION 14.

Famine plants.

### ABRUS PRECATORIUS Linn.

FAM.–Papilionaceæ.

COM. NS. :–*G.* Gunja ; *H.* Gunchi ; *K.* Gunja ; *M.* Gunja.

A deciduous twiner, growing in moist and littoral forests throughout the State ; common in Konkan and North Kanara.

Boiled seeds are eaten and they are said to be whole-some.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons.

### ABUTILON MUTICUM Sweet.

FAM.–Malvaceæ.

COM. NS. :–*M.* Kasili, Karandi.

A hairy undershrub with large orange-yellow flowers and globose capsules, growing on rubbish heaps and along roadsides all over the State.

The seeds are said to be highly nutritious. They are ground and made into cakes either alone or mixed with jowar flour. Sometimes they are boiled and drunk in the form of *Conjee.*

*See* Fibres.

### ACACIA LEUCOPHLOEA Willd.

FAM.–Mimosaceæ.

COM. NS. :–*G.* Haribaval ; *H.* Karir ; *K.* Bili-jali ; *M.* Hivar.

A moderate-sized or a large deciduous spiny tree with straight spines, growing throughout the dry Deccan districts.

The bark is ground and mixed with flour in times of scarcity and eaten. The young pods are also used as vegetable.

*See* Timbers, Fibres, Dyes and Tans, Gums and Resins, Liquors.

### ACALYPHA INDICA Linn.

FAM.–Euphorbiaceæ.

COM. NS. :–*G.* Vanchhikato ; *H.* Kuppi ; *K.* Kuppi-gidda ; *M.* Khokali.

An annual erect herb with angular branches ; leaves ovate or rhomboid-ovate crenate-serrate ; flowers male and female ; it is a weed of cultivation ; common in the Deccan and Southern Maratha Country.

Leaves are eaten as vegetable in times of scarcity.

*See* Medicinal Plants.

## ACHYRANTHES ASPERA Linn.

FAM.—Amarantaceæ.

**SECTION 14.**

**Famine plants.**

COM. NS. :—*G.* Agheda ; *H.* Apang ; *K.* Utranigidda ; *M.* Aghada.

An erect ash-coloured herb with very long spikes ; A common weed growing all over the State in waste places.

The leaves are used as vegetable.

*See* Medicinal Plants, Sacred Plants.

## AERUA LANATA Juss.

FAM.—Amarantaceæ.

COM. NS. :—*G.* Kapurimadhuri ; *H.* Gorkha-bundi ; *M.* Kapurimadhuri.

A herb erect or prostrate with many wooly — tomentose branches ; leaves elliptic with cottony hairs beneath. Flowers greenish white, very small, often forming globose clusters, silky hairy ; A common weed found in the Deccan and Southern Maratha Country,

Leaves are eaten as vegetable in times of scarcity.

*See* Medicinal Plants.

## ALTERNANTHERA TRIANDRA Lamk.

FAM.—Amarantaceæ.

COM. NS. :—*M.* Chibukkâtâ.

A prostrate herb with purplish branches rooting at the lower nodes ; leaves small fleshy ; flowers small, white, shining, in axillary sessile heads. Common throughout the State in damp places.

Leaves are cooked and eaten in times of scarcity.

## ALYSICARPUS RUGOSUS DC.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Shevara.

A tall annual, common in the State especially in Konkan, Deccan and Gujarat.

The seeds are used as food, though not to a great extent, during the seasons of scarcity.

*See* Fodder Plants.

## AMORPHOPHALLUS CAMPANULATUS Blume.

FAM.—Araceæ.

COM. NS. :—*E.* Elephant's Foot ; *G.* Suran ; *H.* Suran ; *K.* Suran ; *M.* Suran.

**SECTION 14.**

**Famine plants.**

A tuberous herb ; tubers of enormous size ; leaves solitary, trisected with long stalks ; grows wild on banks of south Konkan rivers ; there is also a cultivated variety grown in gardens.

The tubers of the wild variety are boiled with tamarind and used as food in times of famine. These tubers have afforded food to many people during famine times.

*See* Medicinal Plants, Vegetables, Poisonous Plants and Fish Poisons.

## ARISAEMA TORTUOSUM Schett. & Endle.

FAM.—Araceæ.

COM. NS. :—*M.* Sap-kanda.

A tall tuberous plant, reaching about a meter high, tubers more or less spherical ; leaves 2-3, palmately divided and cleft, with stalks very long (30-90 cm.) ; sheath mottled ; spadix uni-or-bi-sexual ; growing in Konkan and Western Ghats.

The tubers of this and allied species of Arisaema are used for food in times of scarcity. They are prepared by burying them in masses in the ground, until acetone fermentation sets in, when they are dug up, washed and cooked. By this means the poisonous properties of the tubers are partly removed.

The nutritious starch contained in the tubers might be easily separated by grating and washing when a starch like arrow-root is obtained.

*See* Poisonous Plants, and Fish Poisons.

## ASYSTASIA COROMANDELIANA Nees.

FAM.—Acanthaceæ.

An erect or procumbent, sometimes climbing under-shrub ; leaves small ovate, acute, dark green above, pale beneath ; flowers pale-blue with a yellowish tube, in axillary or terminal racemes ; growing wild in Konkan, Western Ghats ; often cultivated in gardens, on account of its beautiful flowers.

The leaves are eaten as vegetable in times of scarcity.

*See* Ornamental Plants.

SECTION 14.
—
Famine plants.

### BAMBUSA BAMBOS Voss.

FAM.—Gramineæ.

COM. NS. :—*E*. Spiny Bamboo; *G*. Toncer; *H*. Bans; *K*. Bidiru; *M*. Bamboo, Kalak.

A very tall (24-30 m. high) thorny bamboo with many stems; growing along the banks of rivers and nalas in moist monsoon forests in Dangs, Western Ghats, Deccan, and North Kanara.

Used in the same way as *Bambusa vulgaris* Schrad.

*See* Medicinal Plants, Timbers, Fibres.

### BAMBUSA VULGARIS Schrad.

FAM.—Gramineæ.

COM. NS. :—*E*. Striped Bomboo; *M*. Kalak.

An unarmed tree 6-15 m. high; stems green, yellow or striped; cultivated in Bombay, Poona, Satara, Kolhapur and Konkan. Not indigenous.

The fruits of the bamboos, is a grain resembling paddy which is consumed by the poorer people in lieu of common rice when available; a very palatable bread is said to be made from the flour of this rice, although its colour is somewhat darker. The sliced young shoots are also used as a vegetable or pickled.

*See* Timbers, Fibres.

### BOERHAAVIA DIFFUSA Linn.

FAM.—Nyctaginaceæ.

COM. NS. :—*G*. Moto-satodo; *H*. Santhikari; *K*. Kommegida; *M*. Ghetuli, Asu, Punarnava.

A diffuse herb with prostrate stem; leaves in unequal pairs at each node sub-orbicular with undulate pinkish margins; a weed generally found in poorer soils; abundant throughout the State — especially in the Deccan and Gujarat.

Leaves are used as *bhaji* in times of scarcity. They are also used in ordinary times.

*See* Medicinal Plants.

### BOERHAAVIA REPANDA Willd.

FAM.—Nyctaginaceæ.

COM. NS. :—*G*. Satodo; *M*. Pungli, Punarnava.

A diffuse herb with subscandent stem reaching 2 meters; leaves opposite, equal, deltoid ovate; found growing in rich or medium soils, in bunds of fields etc. in Konkan, Deccan.

Leaves and young shoots are used as *bhaji* in times of scarcity.

SECTION 14.
Famine plants.

## BORASSUS FLABELLIFER Linn.

FAM.—Palmaceæ.

COM. NS. :—*G.* Tad ; *H.* Tad ; *K.* Talimara ; *M.* Tad.

A tall palm tree. Very common in the coastal districts north of Ratnagiri, Kolaba and Thana. Cultivated and self-sown.

The seedlings of this plant are eaten by very poor people in ordinary times and also in times of scarcity.

*See* Medicinal Plants, Timbers, Fibres, Gums and Resins, Fruit Trees, Sugars, Liquors.

## CARDIOSPERMUM HALICACABUM Linn.

FAM.—Sapindaceæ.

COM. NS. :—*G.* Karalio ; *K.* Kangu ; *M.* Kapalphodi, Kanphuti.

An annual or perennial climbing herb with white flowers and sub-globose bladdary fruit (Capsule) ; growing common in hedges throughout the State ; Deccan.

Leaves and young shoots are eaten as *Bhaji*.

*See* Medicinal Plants.

## CASSIA AURICULATA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*G.* Awal ; *H.* Taroda ; *K.* Avarika ; *M.* Tarwad.

A tall much branched evergreen shrub with large yellow flowers, growing in arid or semi-arid tracts of the Deccan, Gujarat, along the sea-coast in laterite region.

Leaves are eaten in times of scarcity.

*See* Medicinal Plants, Fibres, Dyes and Tans.

## CASSIA OCCIDENTALIS Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*G.* Kasundari ; *H.* Kasonda ; *K.* Dodda-tagase ; *M.* Kasoda.

A diffuse annual undershrub ; with purple branches ; leaves foetid when bruised ; flowers yellow ; growing throughout the State during the rains amongst rubbish near villages.

Leaves of this plant are used as a green in ordinary times when other vegetables are not easily procurable, and also in times of scarcity.

*See* Medicinal Plants.

## CASSIA SOPHERA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*G.* Kasundari; *H.* Kasondi; *K.* Kasamarda; *M.* Rantakla.

A shrub or undershrub about 2·5-3 m. high; leaves pinnate with 6-10 pairs of leaflets and a solitary conical gland near the base of the rachis; flowers yellow; a common weed in uncultivated places throughout the State.

Leaves of this plant are used as a green even in ordinary times when other vegetables are not easily procurable and also in times of scarcity.

*See* Medicinal Plants.

## CASSIA TORA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*H.* Chakunda; *K.* Chagocha; *M.* Takla.

An annual foetid herb; leaves pinnate with 3 pairs of leaflets; flowers yellow, in pairs; a very common weed all over the State; along roadsides and waste-grounds.

Leaves were largely used as a green during famines.

*See* Medicinal Plants, Sacred Plants.

## CEIBA PENTANDRA (Linn) Gaertn.

### (Eriodendron anfractuosum D. C.).

FAM.—Bombacaceæ.

A prickly tree with palmate leaves and dingy white flowers and oblong capsules like cucumber.

The black seeds from the fruit are roasted and eaten in times of scarcity.

*See* Timbers, Fibres, Oils, Gums and Resins.

## CELOSIA ARGENTEA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*M.* Kurdu.

An annual herb, stem erect simple; leaves variable; flowers at first pinkish, afterwards glistening white, crowded in close cylindrical terminal spikes. Common everywhere in fields, at the close of the rains.

The leaves are eaten during times of scarcity.

*See* Sacred Plants.

### COMMELINA NUDIFLORA Linn.

FAM.—Commelinaceæ.

COM. NS. :—*M.* Gandolgi, Kena.

An annual herb with much-branched procumbent stems; leaves sessile, lanceolate or ovate-lanceolate; flowers with upper two petals dark-blue and outer petal nearly white; capsule oblong with brown rugose seeds; common everywhere in Konkan, Deccan.

The seeds were largely consumed in the Sholapur District during famine times.

### CORCHORUS OLITORIUS Linn.

FAM.—Tiliaceæ.

COM. NS. :—*H.* Koshta; *M.* Banpat.

An annual shrub; leaves elliptic-lanceolate, serrate, with lower serratures prolonged into filiform appendages; flowers pale yellow; common; springing up in gardens and cultivated grounds in Konkan and Deccan and Western Ghats.

Leaves are eaten as a green in times of scarcity.

### CORCHORUS TRILOCULARIS Linn.

FAM.—Tiliaceæ.

COM. NS. :—*K.* Tandassir; *M.* Kadu-chinch.

An annual shrub with hairy stems and branches; leaves elliptic, oblong, serrate; flowers yellow; found growing in Deccan and Gujarat in dry regions.

Leaves are used as a vegetable in times of scarcity.

*See* Fibres.

### CRINUM DEFLEXUM Ker-Gawl.

FAM.—Amaryllidaceæ.

COM. NS. :—*M.* Nag-davana.

A bulbous herb; bulb ovoid with spindle-shaped base; leaves 6-8, linear, about ·75 m. long; flowers white, fragrant at night, 6-12 on the scape; common on the banks of the Deccan rivers.

The bulb is boiled and eaten as *bhaji*.

*See* Ornamental Plants.

### CYANOTIS AXILLARIS Schult.

FAM.—Commelinaceæ.

COM. NS. :—Itsaka.

A creeping hairy annual herb; leaves sessile, flat, narrowly linear; flowers violet-blue, clustered in the inflated sheaths; seeds compressed, beautifully mottled, dark-brown, shining; common in western Deccan; also in Gujarat and Southern Maratha Country.

The seeds of this plant were eagerly sought for during famines.

It appears both from experience and Chemical composition that the seeds are wholesome and nutritious.

### DENDROCALAMUS STRICTUS Nees.

FAM.—Gramineæ.

COM. NS. :—*H.* Bans; *K.* Kitti-bidaru; *M.* Udha, Vasa.

A deciduous densely tufted bamboo; growing throughout the State in deciduous forests.

The grains of this bamboo are used as food like those of *Bambusa bambos.*

*See* Timbers, Fibres, Fodder Plants.

### EHRETIA LAEVIS Roxb.

FAM.—Boraginaceæ.

COM. NS. :—*H.* Datranga, Darar; *K.* Adakbagari; *M.* Datrang.

A middle-sized deciduous tree; growing throughout the State in deciduous forests.

The inner bark of this tree is mixed with bajri flour and eaten.

*See* Timbers, Fruit Trees, Fodder Plants.

### EUPHORBIA HIRTA Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Dudhi; *H.* Dudhi; *K.* Achchegida; *M.* Dudhi, Govardhan.

An annual herb, erect or ascending, hispid with long yellowish hairs; leaves opposite dark green above, pale beneath; flowers crowded in small globose axillary cymes; growing in waste places and cultivated lands; common everywhere in fields and open spaces throughout the State.

Leaves and tender shoots are eaten as a green.

*See* Medicinal Plants.

**SECTION 14.**
**Famine plants.**

### FICUS BENGALENSIS Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Vadlo ; *H.* Bar ; *K.* Ala, Vat ; *M.* Wad.

A large evergreen tree sending down many aerial roots ; planted throughout the State in avenues as roadside trees.

Ripe fruits are eaten in times of scarcity.

*See* Medicinal Plants, Timbers, Fibres, Sacred Plants.

### FICUS GLOMERATA Roxb.

FAM.—Urticaceæ.

COM. NS. :—*G.* Umbro ; *H.* Gular, Umar ; *K.* Atti ; *M.* Umber.

An evergreen tree ; common throughout the State near villages and along streams and rivers ; also planted along road-side.

Ripe fruits are eaten in times of scarcity ; unripe fruits are also eaten pounded with rice or bajri and made into cakes.

*See* Medicinal Plants, Dyes and Tans, Gums and Resins, Fruit Trees (W.).

### FICUS RELIGIOSA Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Papal ; *H.* Pipal ; *K.* Aswatha, Mara ; *M.* Pimpal.

A large evergreen tree ; planted near temples and villages throughout the State.

Ripe fruits are eaten in times of scarcity ; the tender buds are also eaten as vegetable by hill-people in Central India (Madhya Bharat) during famine times.

*See* Medicinal Plants, Timbers, Fibres, Gums and Resins, Fodder Plants, Sacred Plants.

### GISEKIA PHARNACOIDES Linn.

FAM.—Ficoideæ.

COM. NS. :—*M.* Valuchi-bhaji.

A diffuse, somewhat succulent herb ; branches prostrate or ascending ; leaves sub-fleshy variable in shape, small ; flowers small, numerous, in almost sessile cymes ; ripe carpels membranous surrounded by sepals ; seeds solitary, black with scattered white prominences ; found in Konkan and Gujarat.

Leaves used as pot-herb in famine times, also occasionally in ordinary times.

## GUAZUMA TOMENTOSA Kunth.

FAM.—Sterculiaceæ.

COM. NS. :—*E.* Bastard cedar; *M.* Rudrakshi.

A small evergreen tree; cultivated in gardens throughout the State.

The oblong capsules, covered with obtuse black tubercles, are filled with mucilage, which being agreeable to taste, is chewed.

*See* Timbers, Fibres, Fodder-Plants, Ornamental Plants.

## INDIGOFERA CORDIFOLIA Heyne.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Bechka.

A diffuse, copiously branched annual herb with cordate leaves, usually clothed with long white hairs; found in rather dry localities; common all over the State.

The seeds are used by famine-stricken people when other food is not available. The seeds are pounded and made into cakes, either alone or with some cereals.

According to the analysis of Dr. Lyon, they may be classed as a highly nitrogenous pulse.

## INDIGOFERA GLANDULOSA Willd.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Zingru; *M.* Barbada.

An herbaceous annual with trifoliate leaves. A common weed found in Konkan and Deccan, in good gardens and well drained soils.

The people make flour from the seeds and bake it into bread which is used in famine times. The seeds are also rich in nitrogen.

## INDIGOFERA LINIFOLIA Retz.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Dania; *M.* Pandharphalli.

An herbaceous annual of small size with very narrow leaves; found growing in rather dry localities in Konkan and Deccan. In wild state it is rather prostrate.

During famines the seeds of this plant, though unpleasant to the taste, were largely consumed especially in Karnatak and Deccan. They were pounded and made into cakes either alone or with some cereals. According to Dr. Lyon the pulse is rich in nitrogen.

## IPOMOEA RENIFORMIS Chois.

FAM.—Convolvulaceæ.

COM. NS. :—*G.* Undirkani; *H.* Musekani; *K. M.* Undirkani.

A creeping herb with many stems, rooting at the nodes; clothed with long hairs, leaves kidney-shaped; flowers small, yellow; growing in water-logged places in Konkan and Deccan.

Leaves used as *bhaji* in times of scarcity.

*See* Medicinal Plants.

## IPOMOEA SEPIARIA Koenig.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Amti-vel.

A herbaceous perennial with twining slender stem; more or less hairy; leaves medium size, cordate at the base with a wide sinus and rounded lobes; flowers funnel-shaped, pale-purple or whitish. Common in hedges throughout the State.

Leaves are used as *bhaji* during times of scarcity.

## KEDROSTIS ROSTRATA Cogni.

FAM.—Cucurbitaceæ.

COM. NS. :—*M.* Nurakvel.

A scandent plant with angled stem; tendrils simple; leaves membranous, ordicular, bright-green, hairy, cordate at the base; flowers male and female; male flowers pale-yellow; female flowers with oblong, beaked ovary; fruit deep-red, 2·5 cm. long, ovoid, tapering into a long narrow beak; growing in Konkan and common in hedges in Gujarat.

The plant is foetid. The fruits and leaves are eaten in times of scarcity.

## LEPTADENIA RETICULATA W. & A.

FAM.—Asclepiadaceæ.

COM. NS. :—*M.* Kharkhoda, Shinguti.

A twining shrub; stem with corky deeply cracked bark; leaves medium sized, thin, base rounded; flowers small, greenish yellow; fruit-follicle subwoody, 6-8 cm. long, tapering into an obtuse curved beak; seeds comose; growing throughout the dry Deccan districts; common near the sea in Konkan; also in Kanara and Gujarat in hedges.

The leaves and tender shoots are used as vegetables.

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Famine plants.

## LIMNANTHEMUM CRISTATUM Griesb.

FAM.—Gentianaceæ.

COM. NS. :—*M.* Kumudini.

A small aquatic herb; rhisome short, erect with petiole-like branches; leaves, 5-10 cm. in diameter, orbicular, deeply cordate, purplish with green veins beneath; flowers white, many in clusters; fruit broadly ovoid, common in tanks throughout the State; in the tank at Khandala.

The stems and fruit are curried or simply boiled and eaten.

## MADHUKA INDICA Gmel.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Hannage, Pokka; *M.* Moha, Mowra.

A large tree; common in the dry forests throughout the State, also planted as roadside tree.

Both the ripe and the unripe fruit are eaten by the poorer people, but perhaps the most important edible part is the succulent corolla, which is sweet and very nourishing. These flowers are always gathered early in the morning, dried in the sun and then sold as an article of food, being consumed either raw or cooked along with parched grain. About 200-400 lbs. of flowers are sometimes collected from a single tree. *Adivasis* use mahua flowers as a regular article of diet. The oil produced from the fruits is also an important article of diet.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Poisonous Plants and Fish Poisons, Fodder Plants, Liquors.

## MADHUKA LONGIFOLIA Mech.

FAM.—Sapotaceæ.

COM. NS. :—*G.* Mahuda; *H.* Mahua; *K.* Honnage, Pokka; *M.* Moha, Mowra.

A large deciduous tree. Common in the deciduous forests throughout the State; also in Konkan and in North Kanara (rare); often cultivated and self-sown near villages.

Both the flowers and fruits are used as in the preceding species.

*See* Medicinal Plants, Timbers, Oils, Gums and Resins, Fodder Plants, Liquors.

## MARSDENIA VOLUBILIS Cooke.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Dodi ; *H.* Nakchhikui ; *K.* Dudhike ; *M.* Harandodi.

A large twining shrub; older branches ash coloured with lenticels and black-dots ; leaves broadly ovate, cordate ; flowers many, green or yellowish green ; fruit-follicle, slightly tapering to a very blunt point, rugosely striate; found twining over shrubs in the Deccan and Southern Maratha country.

The leaves used as a vegetable.

*See* Medicinal Plants, Fodder Plants.

## MELIA AZADIRACHTA Linn.

FAM.—Meliaceæ.

COM. NS. :—*G.* Limbada ; *H.* Nim ; *K.* Nimba ; *M.* Kadulimb.

A moderate sized to a large tree ; growing throughout in dry regions ; usually planted along road-sides ; also self-sown.

The ripe fruits are eaten, as they contain a small quantity of sweetish pulp in times of scarcity.

*See* Medicinal Plants, Timbers, Fibres, Oils, Fodder Plants, Sacred Plants.

## MORINDA CITRIFOLIA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*G.* Al ; *H.* Al ; *K.* Ainshi ; *M.* Bartondi.

A small tree ; common along the coasts of the Konkan, quite near the sea ; cultivated especially in Khandesh and near Phandharpur for its dye.

The green fruits are used in curries, the ripe ones are also eaten.

*See* Timbers, Dyes and Tans, Fodder Plants.

## NEPTUNEA OLERACEA Lour.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Pani-lajak.

An aquatic, floating annual ; stem elongate, swollen, rooting from the leaf and flower-bearing nodes ; leaves 2-pinnate, leaflets 8-15 pairs ; flowers, yellow minute in oblong heads ; pods stalked, slightly curved, depressed between the seeds, beaked ; grows in tanks in Konkan, Gujarat and North Kanara.

The plant is eaten as a pot herb. The pods are also eaten as vegetable.

### OXALIS CORNICULATA Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*E.* Indian Sorrel; *H.* Amrul; *K.* Hulitinniche-gidda; *M.* Ambuti.

A small procumbent acrid herb; leaves palmately 3-foliate, with obcordate leaflets; flowers yellow; a troublesome weed in gardens; growing throughout the State.

The leaves of this common weed are eaten as salad at all times but much used in seasons of drought.

*See* Medicinal Plants.

### PHASEOLUS SUBLOBATUS Roxb.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Mukani.

A perennial twining plant, densely clothed with ferruginous hairs; leaves tri-foliate; leaflets 3-lobed, 3-nerved; flowers yellow; pod 8-12 seeded.

The plant is closely allied to P. radiatus Linn. The cultivated mug, of which it may be the wild form; growing wild in Konkan, Deccan and Southern Maratha country.

The seeds, said to be rich in nitrogenous matter, are largely used by famine-stricken people.

### PHOENIX SYLVESTRIS Roxb.

FAM.—Palmæ.

COM. NS. :—*E.* Wild date-palm; *G.* Kujuri; *H.* Khajari; *K.* Ichelamora; *M.* Shindi.

A tall graceful palm, with thick hemispherical crown; wild or more often cultivated; found usually along banks and in beds of streams and water-courses, in Surat, Sholapur and Poona districts.

The leaf-buds and ripe yellow fruits are eaten in times of scarcity.

*See* Medicinal Plants, Timbers, Fibres, Fruit Trees, Sugars, Liquors.

## POLYGALA CHINENSIS Linn.

FAM.—Polygalaceæ.

COM. NS. :—*M.* Phutani.

An annual herb 10-25 cm. high; leaves very variable, rather thick; flowers yellow, fading to pink, in few flowered racemes; tolerably common throughout the State, particularly in dry situations.

The young leaves are eaten with salt, chillies and other condiments. They are said to be pleasant to the taste and perfectly wholesome.

## PREMNA INTEGRIFOLIA Linn.

FAM.—Verbenaceæ.

COM. NS. :—*G.* Arni; *H.* Arani; *K.* Ichu; *M.* Aran, Kharanarvel.

A large shrub or a small tree; leaves broadly elliptic, entire or upper part dentate; flowers small, greenish-yellow; fruit globose, smooth, blue-black; near the sea-coast throughout the Konkan and North Kanara. Common about Karwar.

The leaves when bruised have a peculiar and rather unpleasant smell, but these and the tender shoots are boiled with condiments and eaten as a vegetable.

*See* Medicinal Plants, Timbers.

## RIVEA HYPOCRATARIFORMIS Chois.

FAM.—Convolunlaceæ.

COM. NS. :—*M.* Phanji .

A large climber; leaves rather large, orbicular with cordate base, silky-hairy beneath; flowers tubular, fragrant; fruit globose, brown, polished; grows in Konkan and Deccan.

The leaves and young shoots are used as a vegetable.

## SANTALUM ALBUM Linn.

FAM.—Santalaceæ.

COM. NS. :—*G.* Sukhad; *H.* Chandan; *K.* Gandha; *M.* Chandan.

A small evergreen tree; indigenous throughout the dry districts of the State; often along the bunds of tanks and in hedges.

The seeds are eaten during seasons of scarcity.

*See* Medicinal Plants, Timbers, Oils, Sacred Plants.

### SESBANIA AEGYPTIACA Poir.

FAM.—Papilionaceæ.

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COM. NS. :—*G.* Rayasingani ; *H.* Rasin ; *K.* Jinanji ; *M.* Shewari.

A soft-wooded evergreen shrub or a small tree ; commonly cultivated in gardens as a wind-break or to support betel vines.

The seeds are said to contain much nitrogenous matter, and are occasionally used during famines.

*See* Medicinal Plants, Timbers, Fibres, Fodder Plants.

### SOLANUM NIGRUM Linn.

FAM.—Solanaceæ.

COM. NS. :—*G.* Piludi ; *H.* Makoi ; *K.* Kakamunchi ; *M.* Kakamachi.

A variable annual erect herb ; leaves many, ovate-lanceolate ; flowers small in 3-8 flowered cymes ; fruit berry usually purplish-black, smooth, shining ; a weed occurring in cultivated fields all over the State.

The leaves and young shoots are used as a pot-herb. Ripe fruits are also eaten.

*See* Medicinal Plants.

### SOLANUM XANTHOCARPUM Schr. & Wedle.

FAM.—Solanaceæ.

COM. NS. :—*G.* Bhoyaringni ; *H.* Kateli ; *K.* Chikka-sonde ; *M.* Bhui or Kate ringni.

A very prickly, diffuse, bright green perennial herb ; stem zig-zag ; leaves armed on midrib and nerves with long yellow prickles ; flowers purple ; fruit yellow or white with green veins. Common along road side and in waste lands in the Deccan and Konkan.

The unripe fruits are eaten in curries and as a vegetable in times of scarcity.

*See* Medicinal Plants.

### TAMARINDUS INDICA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*G.* Amli ; *H.* Imli ; *K.* Amlika ; *M.* Chinch.

A large tree ; growing in evergreen forests of Konkan and North Kanara. Cultivated and self-sown near villages in waste lands all over the State.

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The leaves and seeds are used in famine times. Roasted seeds are eaten entire or pounded and baked into bread.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans.

### TRIBULUS TERRESTRIS Linn.

FAM.—Zygophyllaceæ.

COM. NS. :—*G.* Gokhru ; *H.* Gokhen ; *K.* Negalu ; *M.* Gokharu ; Sarata.

A procumbent herb ; young parts silky ; leaves pinnate, opposite, flowers solitary, yellow ; fruit globose of 5 woody cocci, each with 2 pairs of hard, sharp spines ; a common weed of drier parts all over the State.

The herb is eaten as a pot-herb.

*See* Medicinal Plants.

### TYPHONIUM BULBIFERUM Dalz.

FAM.—Araceæ.

A small tuberous herb ; leaves triangular ; petiole 12-15 cm. long, usually with a pea-like tuber at the top ; spathe rose-coloured ; spadix yellow ; male and female inflorescence distant ; fruit ovoid Found in Konkan.

Both the bulbs and leaves are eaten boiled during times of scarcity.

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# SECTION 15—SACRED PLANTS.

SECTION 15.

Sacred Plants.

## ACACIA SUNDRA D. C.

### (Acacia catechu Willd, var. Sundra Prain).

FAM.—Mimosaceæ.

COM. NS. :—*G.* Kherio; *H.* Khair; *K.* Kachu; *M.* Khair.

A moderate-sized spiny tree; common throughout the State in dry open thorn forests; along the coasts of Konkan and North Kanara.

In *Smritisar Granth* it is prescribed that the twigs of this tree should be used as tooth-brushes in certain ceremonies as they contain colourless sap (twigs of plants containing coloured sap are prohibited for this purpose).

*See* Medicinal Plants, Timbers.

## ACHYRANTHUS ASPERA Linn.

FAM.—Amaranthceæ.

COM. NS. :—*G.* Agheda; *H.* Apang; *K.* Utranigidda; *M.* Aghada.

An erect ash coloured herb with square stems and very long spikes. A common weed growing all over the State in waste places.

In *Chaturmas Mahatmya,* Chapter XX, this plant is mentioned as a transformation of Buddha. In *Smritisar Granth* it is ordered that the twigs should be used as tooth-brushes, as they contain colourless sap. In *Vritaraj,* page 85, it is directed that on *Bhadrapad Shuddha* 5th (*Rishipanchami*), females should clean their mouths with 108 pieces of the plant, using them as tooth-brushes; but in case of need the number may be reduced to as low as seven; also to bathe 108 times, keeping each time a leaf of this plant on the head. It is also used as *Samidhas* (one of the common sacrificial woods of the Hindus). In *Shravan Mahatmya,* Chapter XIII, it is recommended to worship *Ganapati* (Elephant-headed God) with the leaves of this plant, on *Shravan Shuddha* 4th. The same god is similarly worshipped on *Bhadrapad Shuddha* 4th (*Ganesh Chaturthi*).

*See* Medicinal Plants, Famine Plants.

## ALBIZZIA LEBBAK Benth.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Kalo-shirish; *H.* Kal-shish; *K.* Siris; *M.* Shirish.

A tall deciduous tree growing throughout the State in dry and moist forests; also planted along road-sides.

In *Smritisar Granth* it is laid down that the twigs of the tree should be used as tooth-brushes, as they contain colourless sap.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Fodder Plants, Ornamental Plants.

### AMARANTHUS TRICOLOR Linn.

FAM.—Amarantaceæ.

COM. NS. :—*M.* Math.

An annual herb grown in gardens for its leaves which are used as vegetable.

This plant is one of the five components of the kind of *bhaji* called *panch-bhelli-bhaji* — which Hindus prepare on Saturdays in the month of *Shravan.* This kind of food is partaken of, because it is believed to be particularly acceptable to the gods. Math is always taken, even if any one or more of the other components are wanting.

*See* Vegetables.

### AEGLE MARMELOS Corr.

FAM.—Rutaceæ.

COM. NS. :—*G.* Bel ; *H.* Bel ; *K.* Bela ; *M.* Bel.

A small or moderate sized thorny tree with 3-foliate (rarely more) leaves. Cultivated or wild in dry situations throughout the State.

In Chapter XVIII of *Chaturmasa* Mahatmya is mentioned the origin of this tree. The 3-foliate (tridal) leaf is the symbol of Hindu triad and represents Brahma, Vishnu and Mahesh (Shiva). It is employed as a *patri* in worshipping the deity, particularly Shiva. No other God is generally worshipped with *bel* leaves. On page 352 of *Vritaraj* taken from *Jaimini Aranya Katha,* Durvas Rishi orders Draupadi, the wife of Pandavas to observe the *Bel-laksha-wrata,* i.e. the worship of Mahadeo with a lac of the leaves of this tree. In *Smritisar Granth* it is ordered that the twigs of this tree should be used as tooth-brushes as they contain colourless sap.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Gums and Resins, Fruit Trees (w.), Fodder Plants.

### ANTHOCEPHALUS CADAMBA Miq.

FAM.—Rubiaceæ.

COM. NS. :—*H.* Karam ; *K.* Kadaga ; *M.* Kadamb, Niv.

A large deciduous tree common near villages throughout the Konkan ; often cultivated.

The flowers which are orange-coloured and scented are much esteemed for offerings to Gods in Hindu Shrines.

It is believed that this is the tree on which God *Krishna* had climbed before taking a dive in the water of the the river Jamna near Mathura, in order to kill the venomous cobra called Kaliya.

*See* Medicinal Plants, Timbers, Fodder Plants, Fruit Trees, Ornamental Plants.

### ARECA CATECHU Linn. . .

FAM.—Palmæ.

COM. NS. :—*G.* Hopari ; *H.* Supari ; *K.* Adki ; *M.* Supari.

A tall palm with quite straight stem, cultivated in high rainfall tracts, including Konkan and North Kanara.

In religious ceremonies of the Hindus the nut of this plant, called *Pugiphal* in Sanskrit, is held sacred and is most important. Before commencing any religious ceremony or worship, this nut is worshipped first taking in to be the form of *Ganesh* and then the regular ceremony or worship follows. (Even at the time of installation of the idol of *Ganpati* on *Ganesh--chathurti* day – *Bhadrapad Shuddha* 4th – this nut is worshipped first). In fixing religious ceremonies giving of supari indicates the finalizing of the contract.

*See* Medicinal Plants, Timbers, Fibres, Fruit Trees, Ornamental Plants.

### BAUHINIA MALABARICA Roxb.

FAM.—Caesalpiniaceæ.

COM. NS. :—*K.* Shadloo ; *M.* Amli.

An erect low bushy tree with leaves divided about one fourth way down into two rounded lobes : grown in moist forests of the Konkan and North Kanara.

The leaves of this plant form one of the five components of the kind of *bhaji* – called *panch-bheli-bhaji* – which Hindus prepare on Saturdays in the month of *Shravan.*

### BAUHINIA RACEMOSA Lam.

FAM.—Caesalpiniaceæ.

COM. NS. :—*H.* Gurial ; *K.* Banne ; *M.* Apta.

A small deciduous tree growing throughout the State in deciduous forests.

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An account of the way this tree is to be worshipped, is found in *Dharma Sindhu in the volume Dvitiya Parichhed,* section *Ashwin Mahatmya,* Chapter *Vijaya Dasami.*

This chapter tells us that this tree called *Ashantak* (Sanskrit name) must be worshipped instead of *Shami* (*Prosopis spicigera*), if the latter is not available. A complete narrative of this legend is also to be found in *Sahyadri Khand.*

Early in the morning, people dressed in rich clothes assemble together, and go in procession outside the town where there is the *apta* tree and there, after a priest has recited the prayers, prescribed in the ritual, the chief man of the town cuts a twig, the other people following him. These twigs they take along with them, and going to the nearest temple, usually of a goddess, worship her, and make an offering of a few of the *apta* leaves, together with flowers of *Zendu* (Tagates sp.) (marigold) and blades of rice and corn.

On returning home they first make an offering of the remaining leaves to their household gods, then to their priests together with some copper or silver coins, and to their parents and guardians or to the elderly people in the house; and lastly to their friends saying "Take this gold" for the Hindus believe that the leaves over which the *mantras* were recited, were gold or transformed into gold for the day.

A large number of twigs are sold in streets, markets and temples on this day. The people purchase them, take them home, worship them along with the household gods and distribute them as "gold" to their relatives and friends on Dasara day.

*See* Timbers, Fibres, Gums and Resins, Fodder Plants.

## BENINCASA CERIFERA Sav.

FAM.—Cucurbitaceæ.

COM. NS. :—*G.* Kohala ; *H.* Golkaddu ; *K.* Sandigumbala ; *M.* Kohala.

A large hairy climber with large, long cylindrical fruits covered with waxy bloom ; cultivated occasionally in the gardens during the rainy season.

Page 46 of *Vrat Kaumudi* recommends the worship of this plant considering it a goddess. *Dharmaraj,* tells Krishna and Narad, tells king *Chandrasen* to observe the *vrat* of this plant (Vide *Vratraj* in selections taken from *Padma Puran*). Its fruit is also cut with some ceremony, called *kohala muhurt,* a day or two before a marriage.

*See* Medicinal Plants, Vegetables.

## BRIDELIA RETUSA Spreng.

FAM.—Euphorbiaceæ.

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**Sacred Plants.**

COM. NS. :—*G.* Asana ; *H.* Gauli ; *K.* Garige ; *M.* Asana.

A moderate-sized deciduous tree growing throughout the State in deciduous forests ; tolerably common in the Deccan and Konkan hills

In *Smritisar Granth* it is ordered that the twigs of this tree should be used as tooth-brushes, as they contain colourless sap.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees.

## BUTEA MONOSPERMA O. Kuntz.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Khakaro ; *H.* Dhak ; *K.* Kuttugga ; *M.* Palas.

A moderate-sized deciduous tree. common in deciduous forests throughout the State.

The leaves of this plant are trifoliate ; the middle leaflet is supposed to represent *Vishnoo,* the left *Brahma,* and the right *Shiv.* Hence its worship is enjoined in *Chaturmas Mahatmya.* It is used in the following three ceremonies :—

1. The leaves are used as platters on the occasion of the investiture of the sacred thread, when the ceremony called *Chowl* (when the barber removes the last tuft of hair from the head of the boy) is performed.
2. The dry twigs, or *Samidhas* are used for the feeding of *homa* or sacred fire.
3. The stem is used as a staff on the day of *Sodmunj,* a part of the thread ceremony.

सत्यमेव जयते

In *Smritisar Granth* it is ordered that the twigs of this tree should be used as tooth-brushes as they contain colourless sap.

*See* Medicinal Plants, Timbers, Fibres, Oils, Dyes and Tans, Gums and Resins, Fodder Plants, Ornamental Plants.

## CALOTROPIS GIGANTEA R. Br.

FAM.—Asclepiadaceæ.

COM. NS. :—*G.* Akdo ; *H.* Ak ; *K.* Arka ; *M.* Rui.

A large shrub with milky juice ; common throughout the State in dry waste places.

In *Chaturmas Mahatmya* Chapter XX, in the narration of *Gallava Rishi* taken from *Skund Puran,* this shrub is mentioned to be the transformation of *Surya* (the Sun). It is used in vairous ceremonies, both religious and those of time-hallowed custom. The leaves are used as *patri*, in the same way as those of *Shami* in the worship of *Ganapati, Haritalika, Pithori*, etc. They are also employed in *Shasthi pujan* (a ceremony performed on the sixth day, after confinement for propitiating "*Jiwti*" the goddess of destiny) by females; *Pata* (an oblong stone used for grinding chatany and masala) is covered over with the leaves of this plant, having the figures of children drawn on them with *shendur*. These figures are worshipped.

In *Sharavan Mahatmya* it is ordained to worship *Maruti* (known also as *Hanuman* or Monkey God) on every Saturday with a garland of leaves and flowers of *Rui* as they are sacred to him. The twigs are used as substitutes for tooth-brushes according to *Smritisar Granth*. The twigs are also employed as *s̄amidhas* for feeding of sacred fire.

When a Hindu is to marry a third time, it is believed that the third wife will soon die; in order to avoid such a calamity, the man is first married to this shrub, which is then cut down. This ceremony is believed to ensure the longivity of the fourth, but really the third wife whom he now marries.

*See* Medicinal Plants, Fibres, Gums and Resins, Fodder Plants, Poisonous Plants and Fish Poisons.

### CAPPARIS ZEYLANICA Linn.

FAM.—Capparidaceæ.

COM. NS. :—*M*. Govindphal, Wagati.

A rigid shrub found along the nalas of the Konkan.

The raw fruits of this plant, which is irregularly ovoid, rather big, pointed or blunt, are made into *bhaji* on the twelth day (*dwadashi*) in the month of Ashadh. The fruit is invariably associated with the *bhaji* or dish made for those days.

*See* Fruit Trees (w.).

### CASSIA FISTULA Linn.

FAM.—Caesalpinaceæ.

COM. NS. :—*G*. Garmala; *H*. Amaltas; *K*. Kakka; *M*. Bahava.

A moderate-sized deciduous tree, common throughout the State in mixed monsoon forests; planted as an ornamental and roadside tree.

This handsome tree is held sacred to Ganeshwar. The people in Mysore put stakes of the plant in the ground and worship them.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fodder Plants, Ornamental Plants.

### CASSIA TORA Linn.

FAM.—Caesalpinaceæ.

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**Sacred Plants.**

COM. NS. :—*H.* Chakunda ; *K.* Targosi ; *M.* Takala.

An annual foetid herb ; very common weed all over the State, along road-sides and in waste places.

The leaves of the plant are one of the five components of the *Bhaji* — called *panch-bhelli-bhaji* — which Hindus prepare on Saturdays of the month of *Shravan.*

*See* Medicinal Plants, Dyes and Tans, Famine Plants.

### CELOSIA ARGENTEA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*M.* Kurdu.

An annual herb ; stem erect, simple ; leaves variable ; flowers at first pinkish, afterwards glistening white, crowded in close cylindric terminal spikes. Common everywhere in fields, at the close of the rains in the State.

The leaves of the plant are one of the five components of the *Bhaji* called *panch-bhelli-bhaji* which Hindus prepare on Saturdays of the month of *Shravan.*

### CHLOROPHYTUM TUBEROSUM Baker.

FAM.—Liliaceæ.

COM. NS. :—*M.* Kuli.

सत्यमेव जयते

A small herb with ellipsoid tubers ; leaves long sickle-shaped, margins undulate ; flowers white ; growing on *mal-ran* and pastures during early rains, in Konkan and Deccan.

The leaves of this plant are one of the components of the *Bhaji* called *panch-bheli-bhaji* which Hindus prepare on Saturdays of the month of *Shravan.*

### CROTALARIA JUNCEA Linn.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Sana ; *H.* San ; *K.* San ; *M.* San, Tag.

A tall herb with simple leaves and yellow flowers in racemes ; pods inflated ; generally cultivated for green manure or for extracting fibre.

The great Hindu law-giver *Manu* enjoined on the *Khsatrias* use of the sacred thread made from the fibres of this plant,

### CUCUMIS SATIVUS Linn.

FAM.—Cucurbitaceæ.

COM. NS. :—G. Kakri ; K. Savalikai ; M. Kakadi, Khira.

A climbing herb largely cultivated in gardens, throughout the year in the State.

In *Vratraj*, it is related that *Suta* told the *Rishis* and *Shiv* told his wife *Parvati* to worship this plant, as by doing so females do not lose their husbands or that these survive them. The fruit of this plant is cut into thin slices and employed in the worship of snakes on *Shravan Shudh* 5th (*Nagpanchami day*). It is likewise employed in the worship of many other gods.

*See* Medicinal Plants, Oils, Vegetables.

### CURCUMA LONGA Linn.

FAM.—Scitaminaceæ.

COM. NS. :—G. Halada ; *H.* Halad ; K. Arishina ; *M.* Halad.

A stemless herb with thick cylindric tubers bright yellow inside; leaves large, cultivated as a garden crop in good soil in the Konkan, Deccan and Gujarat.

In worshipping images of Gods the two substances, *Halad* and *Kumku* are used along with other substances such as *Gandh* (sandlewood paste) etc. *Halad* is the powder-prepared from the dried tubers of this plant. *Kumku* is also the powder of tubers of this plant, coloured red by being immersed for some days in alkaline solutions, generally of lime-water. *Halad* and *Kumku* are offered to the *devi* (goddess).

*See* Medicinal Plants, Dyes and Tans, Condiments and Spices.

### CYNODON DACTYLON Pers.

FAM.—Gramineæ.

COM. NS. :—G. Dhro ; *H.* Durba ; K. Garikehallu ; *M.* Durva, Harali.

A perennial prostrate grass, widely creeping, forming matted tufts; grows all over the State, both in cultivated fields and in uncultivated places.

The *Chaturmas Mahatmya* says that this grass is the transformation of *Rahu*. In the description of *Durva ashtami*, that is its worship on *Bhadrapad Shudh* 8th, the Hindus are directed to go to this plant, pray to it, pluck it from the ground, bring it home and worship it along with *Shiv;* pray to her (Durva is a goddess) to increase his family, as she (this plant) is very fertile and gregarious. On page 156 of the same work is ordained the worship of *Ganapati* with six *durvas* every day. The marriage of this plant with Vad (Ficus bengalensis) is also ordained.

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For the worship of *Ganapati durva* is absolutely necessary.

It is commonly called hardali, but is known as *durva* in religious books and during religious ceremonies.

*See* Medicinal Plants.

### DESMOSTACHYA BIPINNATA Stapf.

FAM.—Gramineæ.

COM. NS. :—*G.* Dabha; H. Dab; *M.* Darbha, Kush.

A perennial tall grass; grows in drier parts of open waste lands in Saurashtra, Gujarat, Konkan.

In Chapter XX of *Chaturmas Mahatmya* this plant is stated to be a transformation of *Ketu.* Chapter XXVI of *Shravan Puran* ordains that these *darbhas* should be pulled out of the ground on *Pithori Amavasya;* unless this is done, the plants are not considered fit for use in sacred ceremonies. They are mostly employed in various religious rites, such as tarpan (offering) etc. and at the time of *Shradha Paksha,* performed in honour of the dead.

They are also used as *samidhas* to feed sacrificial fire (*Homa*).

*See* Medicinal Plants.

### ECLIPTA ERECTA Linn.

FAM.—Compositæ.

COM. NS. :—*G.* Bhangro; *H.* Bhangra; *K.* Ajagara; *M.* Maka.

An annual erect or prostrate herb growing wild in moist places all over the State.

The plant is used on the days when *Shardha* (ceremony in honour of the dead) is performed. The leaves of the plant are thrown over *pindas* (The balls of cooked blessed rice) made in honour of the dead. A *kurcha* or a brush-like appliance is made with leaves of the plant to sprinkle water in these ceremonies.

*See* Medicinal Plants.

### ELAEOCARPUS GANITRUS Roxb.

FAM.—Tiliaceæ.

COM. NS. :—*H.* Rudrak; *M.* Rudraksha.

A large tree found in Konkan and Kanara ghats. The five grooved and elegantly tubereled nuts are worn in the form of necklaces by *Shivabhaktas* (worshipper or followers of *Shiv*) in order to obtain *Shivloka* (heaven wherein the god Shiv resides), and to gain his graces. A good account relating to this practice is to be found in the book called *Shivlilamrut*. The plant being rare in the ghats of the State the nuts are imported in large quantities from Nepal, Singapore, etc.

*See* Timbers.

### ELAEOCARPUS TUBERCULATUS Roxb.

FAM.—Tiliaceæ.

COM. NS. :—*H.* Rudrak ; *K.* Bhuteli ; Rudraksha.

A very large evergreen tree buttressed at the base. Common on the Girsoppa ghats in North Kanara.

Nuts are used in the same way as the preceding species.

*See* Timbers.

### EMBLICA OFFICINALIS Gaertn.

FAM.—Euphorbiaceæ.

COM. NS. :—*G.* Amala ; *H.* Amlika ; *K.* Amalaka ; *M.* Avla.

A small or middle-sized deciduous tree growing throughout the State in deciduous forests ; wild and planted.

Chapter 1 of *Kartik Mahatmya,* ordains the worship of this tree and the feeding of a Brahmin couple under it, whereby all the sins are washed off. *Vrat Kaumudi* ordains the *Vrat* and worship of this plant.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Fodder Plants.

### EUPHORBIA NERIFOLIA Linn.

FAM.—Euphorbiaceæ.

COM. NS. :—*K.* Yellikali ; *M.* Thor, Sabar.

A shrub armed with stipular spines ; branches jointed, cylindric or with 5 spirally twisted ribs ; grows throughout the State in waste, stony dry situations.

This plant is sacred to the goddess of serpents.

### FERONIA LIMONIA (L) Swingh.

FAM.—Rutaceæ.

COM. NS. :—*G.* Kavit; *H.* Kait ; *K.* Byala ; *M.* Kavath

A large deciduous thorny tree, growing wild throughout the State in dry situations.

In *Smritisar Granth* it is ordained that the twigs of this tree should be used as tooth-brushes.

*See* Medicinal Plants, Timbers, Oils, Gums and Resins, Fruit Trees, Fodder Plants.

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**Sacred Plants.**

### FICUS ARNOTTIANA Miq.

FAM.—Urticaceæ.

COM. NS. :—*M.* Pair.

A large shrub or a small tree; leaves rather large, cordate; found throughout the Konkan and North Kanara on rocks near the coast; also in the Western ghats.

The leaves of this plant are one of five leaves (*panch-pallav*), used by the Hindus for platters and pouring libations.

### FICUS BENGALENSIS Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Vadlo; *H.* Bar; *K.* Ala; Vat; *M.* Wad.

A large evergreen tree sending down many aerial roots; planted throughout the State in avenues as roadside trees.

In chapter XX of *Chaturmas Mahatmya* it is mentioned that *Brahma* was transformed into a *Wad* tree. Its dry twigs are used as *Samidhas* for producing sacred fire. The leaves are employed as one of the *Panch-pallavas* (the five leaves) used by the Hindus as platters and also for pouring libations. In *Vratraj*, women are asked to worship this tree on *Jestha shudha* 15th, to water it, to wind a thread round it, to worship it and go round it (*pradakshina*). The reason of this worship is given in *Vrat Kaumudi*, where in it is mentioned that Savitri, the wife of Satyavan, worshipped this tree and thereby got back her deceased husband.

*See* Medicinal Plants, Timbers, Fibres, Famine Plants.

### FICUS RACEMOSA Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Umbro; *H.* Gular, Umar; *K.* Atti; *M.* Umber.

A nearly evergreen tree, common throughout the State near villages and along streams and rivers; also planted along road-side.

In *Chaturmas Mahatmya* it is mentioned that *Shukra* (Teacher of the demons) was transformed into this tree. Its stem is used as a nominal prop for *Mandapas* on the day of *muhurth-medh*—a ceremony performed a day or two before marriage. Its leaves are used as *patri* in the worship of *Ganapati*, etc. The twigs are used as *samidhas* for sacrificial fires. The fruits are strung and put round a pregnant womans neck on a particular day during the eight month of pregnancy. It is mentioned in *Gurucharitra*, that Guru or the god *Dattatraya* lives on this tree. The fourth incarnation of Vishnu named *Narasinha*, after tearing the demon *Hiranyakashyapu* with his nails, was relieved of the demon's poison by inserting them in the stem of this tree.

*See* Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins, Fruit Trees (w.), Fodder Plants, Famine Plants.

### FICUS RELIGIOSA Linn.

FAM.—Urticaceæ.

COM. NS. :—*G.* Pipal ; H. Pipal; *K.* Aswathamara ; M. Pimpal.

A large evergreen tree, planted near temples and villages throughout the State.

Chapter XX of *Chaturmas Mahatmya* tells us that this tree is the transformation of the gods' *guru*, and is termed *Ashwatha*. The cause of this transformation is that this tree is frequented by all the gods and it is, therefore, ordered that it should be watered, worshipped and *pradakshinas* performed round it. The tree is also used for *samidhas* and its leaves for platters in *panch-pallava* and for pouring libations.

*See* Medicinal Plants, Timbers, Fibres, Gums and Resins, Fodder Plants, Famine Plants.

### GOSSYPIUM SPECIES.

FAM.—Malvaceæ.

COM. NS. :—*G.* Kapas ; *H.* Kapas ; *K.* Hatti ; *M.* Kapashi.

A shrub cultivated all over the State for its fibres. There are many species suited to different tracts.

The sacred thread of the Hindus, must according to the institutes of Manu be made of cotton only ; and moreover this thread should be spun, tied and finished by the Brahman alone ; no person of any other caste being permitted to prepare it.

*See* Fibres.

### HIBISCUS ROSA-SINENSIS Linn.

FAM.—Malvaceæ.

COM. NS. :—*G.* Jasua ; *H.* Jasum ; *K.* Dasvala ; *M.* Jasawand.

A shrub with large showy flowers of different colours (white, yellow, orange, crimson, bright-red, etc.) cultivated in gardens everywhere.

The red flowers of this plant are specially offered to the God *Ganapati*.

It may be for this reason that in the gardens of the Hindus, the red varieties of this plant are usually found.

*See* Medicinal Plants, Ornamental Plants.

### IPOMOEA BILOBA Forsk.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Maryad Vel, Samudraphen.

A prostrate creeper with large long root, deeply two lobed leaves and large rose-purple flowers, common throughout the State on sandy sea shores where it serves to bind the sand.

The following curious practice is observed by Hindus at Bassein and some villages of the Konkan, though no authority is found, on this subject, in the sacred books.

This creeper is twined round the cot of a Hindu mother on the sixth day after her confinement and is intended to serve as a protection to the new-born babe against any evil effects that might arise from the visit of *Jivati* or *Satvi* (Goddess of destiny), who is supposed, on this day, to call for the purpose of writing the child's destiny on its forehead, and sometimes even carry it away. The notion, of this creeper being used in the manner described above seems to be probably suggested by the fact, that as it grows on sea side and serves to bind the sands together and prevents the enchroachment of the Sea, it might so to speak, be used to bind the child to its mother and prevent the effect of *Satvi's* evil intentions. (Lisboa)

### LEEA MICROPHYLLA Roxb.

FAM.—Vitaceæ.

COM. NS. :—*M.* Dinda.

An erect, rather large, perennial herb ; root tuberous ; leaves simple, cordate ; flowers small white in terminal, branched cymes ; fruit small, depressed globose. Found in Konkan and Western ghats.

The leaves of this plant are one of the five leaves (*panch-pallavas*), used by the Hindus as platters and for pouring libations.

### MANGIFERA INDICA Linn.

FAM.—Anacardiaceæ.

COM. NS. :—*G.* Ambo ; *H.* Aam ; *K.* Mavin-mara ; *M.* Amba.

A large evergreen tree ; common everywhere in the State ; wild and cultivated.

In *Chaturmas Mahatmya* it is said that this tree is the transformation of the God *Prajapati* (Creater). In *Smritisar Granth* the twigs of this are ordered to be used as tooth-brushes, and its leaves as platters in *Panch-pallavas* and for pouring libations; flowers are used in the worship of *Shiv* on the day of *Maha Shivaratri* in the month of Magh. The leaves are employed in adorning *Mandapas* and houses on occasions of various ceremonies. The flowers are one of the five arrows of *Kamdev*, the God of love.

*See* Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins, Fruit Trees, Fodder Plants.

### MELIA AZADIRACH Linn.

FAM.—Meliaceæ.

COM. NS. :—*G.* Bakan limbado ; *H.* Bakain ; *K.* Beon ; *M.* Padrai. A deciduous tree, commonly cultivated all over.

The nuts of this tree are frequently strung and worn round the necks ; and during the prevalence of small-pox, etc., are suspended over the doors and verandahs.

*See* Timbers.

### MELIA AZADIRACXTA Linn.

FAM.—Meliaceæ.

COM. NS. :—*G.* Limbada ; *H.* Nim ; *K.* Beow ; *M.* Kadu-limb.

A moderate-sized to a large tree ; growing throughout the State in dry regions ; usually planted along roadside ; also self-sown.

When nectar was being taken to heaven from the world below for the use of the gods, it is believed that a few drops of it fell on this tree. Hence on new years' day of *Shalivahan Shak* (*Varshapratipada* or *Gudhi-padava*), Hindus eat its leaves in the hope of thereby acquiring freedom from diseases.

*See* Medicinal Plants, Fibres, Oils, Fodder Plants, Famine Plants.

### MELOTHRIA HETEROPHYLLA Cogn.

FAM.—Cucurbitaceæ.

COM. NS. :—*M.* Gometi.

A scandant herb with perennial roots consisting of several tubers, leaves of various shapes, flowers dioecious, fruit oblong-ovoid, cylindric, tapering towards the apex, ribbed, bright-red when ripe, found in Konkan ; Deccan — Mahabaleshwar, Karla,

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The branch of this plant is suspended by some people over the hood of the idol of Cobra on *Nagapanchami* day or during his worship. The fruits of this plant are eaten as *Bhaji* on *dwadashis* (12th Day) in the month of *Ashad.*

## MUSA PARADICIACA L. Kunth.

## Var. SAPIENTUM O.)

FAM.—Musaceæ.

COM. NS. :—*G.* Kela ; *H.* Kela ; *K.* Bale ; *M.* Kele.

A tree-like succulent herb with false stem formed by the sheaths of leaves ; leaves very large ; flowers in decurved spadix ; fruit fleshy, oblong, cultivated all over ; in coastal and ghat districts and in small gardens near the banglows.

In *Vratraj* it is ordained that females should worship this plant on the 4th of *Kartik Shudh,* whereby their husbands are said to survive them and their life is lengthened. This plant is also worshipped on the 3rd of *Shravan.* The cut stems of the plant laden with bunches of fruits are usually placed at the doors of houses, during marriage or other festivals, as emblems of plently and fertility. Small plants are generally tied at the four corners of the low stools (*Chavarang*) on which images of gods are placed and ceremonially worshipped.

*See* Medicinal Plants, Fibres, Fruit trees.

## NELUMBO NUCIFERA Gaertn.

## (NELUMBIUM SPECIOSUM Willd.)

FAM.—Nymphaeaceæ.

COM. NS. :—*G.* Suriyakamal ; *H.* Kamal ; *K.* Kamala ; *M.* Kamal.

A large acquatic herb with elongate creeping stem, rooting at the nodes ; flowers solitary, white or rosy ; growing in tanks in warmer parts ; cultivated in tanks in the State.

During the worship of Shiv, white flowers of this plant are offered, other colours being considered not suitable. On *Bhadrapad Shudha* 4th (*Ganesh Chaturthi*) *Kamal* (lotus) flower is offered to Ganpati at the time of the worship. It is believed that the Goddess Lakshmi resides or has her abode in the central yellow part (stamens and stigmas) of *Kamal* (lotus) flower.

The spiral fibres, found in the leaves and scapes of this plant, are made into wicks for lamps, which are lighted by Hindus in temples.

*See* Medicinal Plants.

### NERIUM ODORUM Soland.

FAM.—Apocynaceæ.

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COM. NS. :—*G.* Kaner; *H.* Kaner, Karber; *K.* Kanagile, Karagir; *M.* Kanher.

A large evergreen shrub with milky juice; flowers red-rose or white fragrant; grows wild by the banks of rivers in the Deccan, Khandesh and Nasik districts; planted in gardens throughout the State; also used as a hedge plant.

The red flowers of this plant are specially offered to *Ganapati* and *Surya* at the time of their worship.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons, Ornamental Plants.

### NYCTANTHES ARBOR-TRISTIS Linn.

FAM.—Oleaceæ.

COM. NS. :—*G.* Jayaparvati; *H.* Har-Singhar; *K.* Parijata; *M.* Parijataka, Prajakta.

A large shrub or a small tree widely cultivated in gardens all over the State, found wild in Satpuda forests in Khandesh.

This tree is supposed by the Hindus to have been brought from heaven by the God *Krishna* for his wife *Satyabhama* on account of the fragrance of its flowers. Hence the use of its highly scented flowers in the worship of all the gods.

*See* Medicinal Plants, Oils, Dyes & Tans, Fodder Plants, Ornamental Plants.

### NYMPHAEA PUBESCENS Willd.

### (NYMPHAEA LOTUS Linn.).

FAM.—Nymphaeceæ.

COM. NS. :—*G.* Kanval; *H.* Kanwal; *K.* Bilitavarai; *M.* Lalkamal.

A large acquatic herb; root-stock tuberous, short, erect, roundish, flowers solitary, red, pale-rose or white, open in the morning only. Cultivated in many places in the State, in warmer regions.

The religious importance the same as *Nelumbium nucifera.*

*See* Medicinal Plants.

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### OCIMUM SANCTUM Linn.

FAM.—Labiateæ.

COM. NS. :—*G.* Tulasi ; *H.* Tulsi, Vrinda ; *K.* Tulasi ; *M.* Tulas.

An annual plant with hairy purplish stems ; flowers in racemes, in close whorls ; grown in and near Hindu houses and temples all over the State.

This plant is ordained, by the sacred books of the Hindus, to be used in religious ceremonies. *Vishnu* is the only God who is worshipped with the leaves of this plant. The leaves of this plant are thrown over the balls of cooked rice (called *pind*) made in honour of the dead. A sort of a brush-like appliance made of leaves of this plant is used for sprinkling water at ceremonies in honour of the dead. The *Vaishnavas* (The followers of Vishnoo) wear necklaces made of beads made from the roots or stem of this plant.

*See* Medicinal Plants.

### PANDANUS ODORATISSIMUS Linn.

FAM.—Pandanaceæ.

COM. NS. :—*G.* Kewoda ; *H.* Hetgi ; *K.* Kedige ; *M.* Kevada.

A tall shrub, growing in sandy places near the sea-coast in Konkan and North Kanara ; also planted.

The flowers are particularly offered to *Ganapati* during his worship on *Ganesh-Chaturthi* (*Bhadrapad Shudha* 4th).

*See* Medicinal Plants, Fibres, Oils,

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### PROSOPIS SPICIGERA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*G.* Samru ; *H.* Chaunkra ; *K.* Banni ; *M.* Saunder, Shami.

A moderate-sized deciduous thorny tree growing in the dry forests of the Deccan and Gujarat.

The worship of this tree is enjoined in *Vratraj* to be performed on the tenth day of *Ashwin Shudha Ten* (Dasara) or *Vijaya Dashami*, on this day, the Pandavas took back the weapons they had left on this tree before going to *Vanvas*. This day was considered to be auspicious for resuming campaigns after the rainy season by the Marathas. The dry twigs are employed as *Samidhas* for feeding the sacred fire. The leaves are used as *patri* (leaf-offering), in the worship of *Ganapati*.

*See* Timbers, Gums and Resins, Fodder Plants.

## PUTRANJIVA ROXBURGHII Wall.

FAM.—Euphorbiaceæ.

COM. NS. :—*H.* Jaiput, Putijiya; *K.* Putra-jivi; *M.* Jivan-putra, Putranjiva.

An evergreen tree with pendulous branches, growing in the evergreen forests of the Konkan and North Kanara; sometimes planted.

The black nuts of this plant are made into necklaces or rosaries and are put round the necks of children, as it is supposed that they have the power of warding off diseases caused by evil sight. Hence its name *Putranjiva* (Life of the child).

*See* Timbers, Oils, Fodder Plants.

## SANTALUM ALBUM Linn.

FAM.—Santalaceæ.

COM. NS. :—*G.* Sukhad; *H.* Chandan; *K.* Gandha; *M.* Chandan.

A small evergreen tree; indigenous; throughout the dry districts of the State; often along the bunds of tanks and in hedges.

The paste of the heart-wood (*gandh*) is one of the important articles of *puja* of the gods.

*See* Medicinal Plants, Timbers, Oils, Famine Plants.

## SARACA INDICA Linn.

FAM.—Cæsalpiniaceæ.

COM. NS. :—*G.* Ashopalava; *H.* Asok; *K.* Ashuge, Ashok.

A handsome evergreen tree with beautiful orange-coloured flowers; grows in the evergreen forests of the Konkan and North Kanara; rather common in the Western ghats; also planted in gardens.

In *Vratraj* it is ordained to worship this tree on *Chaitra Shudh* 13th. It was under this tree that *Sita*, the wife of *Ram*, passed her days when she was imprisoned by *Rawan*. It is so named because under it she was relieved of her grief. (A — away from; Shok — grief).

*See* Medicinal Plants, Timbers Ornamental Plants.

## SESBANIA GRANDIFLORA Pers.

FAM.—Papilionaceæ.

COM. NS. :—*G.* Agathio; *H.* Agusta; *K.* Agase; *M.* Agasta, Hadga.

A soft-wooded, short lived tree with large white and purple flowers grown about temples and villages all over the State.

Some people use the leaves and flowers of this plant for puja of *pindas* along with leaves of *maka* (Eclipta erecta) and *Tulasi* (Ocimum sanctum) at the time of *Shradh.*

*See* Medicinal Plants, Timbers, Gums and Resins, Vegetables, Fodder Plants.

### SMITHIA SENSITIVA Ait.

FAM.—Papilionaceæ.

COM. NS. :—*M.* Kavla.

An annual diffuse much branched herb; flowers yellow; common in the State towards the close of the rains.

The leaves of this plant are used especially as a pot-herb on every Monday of *Shravan.*

*See* Fodder Plants.

### SYZYGIUM CUMINI Skeel.

FAM.—Myrtaceæ.

COM. NS. :—*G.* Jambu; *H.* Jaman; *K.* Jambu, Neralu; *M.* Jambul.

A large evergreen tree; wild and cultivated; growing throughout the State along river banks and moist localities.

The god *Megh* is said to have been transformed into a jambul tree. The colour of the fruit being dark like that of *Krishna,* this plant is very dear to Him; it is therefore, worshipped and Brahmins are fed under it. The leaves are used as platters or *punch-pallavas* and for pouring libations.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Fodder Plants.

### TAGETUS ERECTA Linn.

FAM.—Compositæ.

COM. NS. :—*G.* Makhamala; *H.* Genda; *M.* Zendu.

A small herbaceous plant with large yellowish showy flowers. Grown in the gardens as an ornamental plant. On *Vijaya Dashami* day (Dasara) the idols and weapons are worshipped particularly with the flowers of this plant. Garlands made of the flowers are used for decorating purposes on this day.

*See* Medicinal Plants.

### TAGETUS PATULA Linn.

FAM.—Compositæ.

COM. NS. :—*G.* Makhamal; *H.* Genda; *M.* Zendu.

A small herbaceous plant with small yellowish flowers; grown in the gardens as an ornamental plant.

Sacred importance same as the above species.

### THESPESIA POPULNEA Soland ex Corr.

FAM.—Malvaceæ.

COM. NS. :—*G.* Paraspiplo; *H.* Paraspipal; *K.* Arasi; *M.* Bhend.

A moderate-sized evergreen tree growing along the sea-shores of the Konkan and N. Kanara; often cultivated as a road-side tree.

The goddess *Gaur* is much pleased with yellow flowers of this tree; hence these are invariably offered to her during her worship. The same flowers are also offered to *Ganapati* and other deities, which are not particularly averse to yellow colour.

*See* Medicinal Plants, Timbers, Fibres, Oils, Fodder Plants, Ornamental Plants.

### TRICHOSANTHES PALMATA Roxb.

FAM.—Cucurbitaceæ.

COM. NS. :——*G.* Ratan-indrayan; *H.* Lal-indrayan; *K.* Avagudahannu; *M.* Kaundal.

A large climber with robust stem; fruits globose red when ripe, with 10 orange streaks; wild in Konkan, Deccan and Southern Maratha Country.

On the first of *Ashwin* at the time of *ghata-sthapana* a sort of altar called *ghat* is raised for the Goddess Bhagawati; above this altar a canopy made of bambu is fixed. It is tastefully decorated with choicest flowers and fruits available at the time, among which the light-orange coloured fruits of this plant are hung.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons.

### WRIGHTIA TINCTORIA R. Br.

FAM.—Apocynaceæ.

COM. NS. :—*G.* Indrajav; *H.* Indrajav, Khirai; *K.* Kuda; *M.* Kala-Kuda.

A small deciduous tree growing throughout the State in deciduous forests.

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Sacred Plants.

In *Smritisar Granth* it is ordained that the twigs of this tree should be used as tooth-brushes.

*See* Medicinal Plants, Timbers, Dyes & Tans, Fodder Plants.

## ZIZYPHUS JUJUBA Lamk.

FAM.—Rhamnaceæ.

COM. NS. :—*G.* Ber ; *H.* Ber ; *K.* Bogari ; *M.* Bor.

A small spiny sub-deciduous tree growing throughout the State in dry situations, in open dry forests, on poor soils and in rocky places.

In *Smritisar Granth* it is ordained that the twigs of this tree should be used as tooth-brushes.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees, Fodder Plants.

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## SECTION 16—ORNAMENTAL PLANTS.

SECTION 16.
—
Ornamental plants
Annuals.

This section includes indigenous plants which are commonly grown in gardens, as well as those which are wild but are ornamental and are worth introducing in gardens. Exotics which have been introduced in this State for a long time, some nearly a century ago, and are now practically naturalized have also been intended. More recent introductions have generally not been included, as such inclusion would involve the writing of a separate book.

The plants have been grouped under the following sections—

(1) Annuals.
(2) Aquatics.
(3) Bulbs and Tubers
(4) Climbers.
(5) Ferns.
(6) Orchids.
(7) Shrubs.
(8) Trees.

### ANNUALS.

#### ALTHAEA ROSEA Vac.

FAM.—Malvaceæ.

COM. NS. :—*E.* Hollyhock.

A hairy herb about 1·8 m. high; leaves long petioled, cordate-ovate, 5-7 lobed. Flowers fairly large with short stalk of purple, rose, yellow or white colours; a native of Crete and Greece. In bloom from January to March. Propagated by seeds.

*See* Dyes and Tans.

#### AMARANTUS CAUDATUS Linn.

FAM.—Amarantaceæ.

COM. NS. :—*E.* Love-lies bleeding.

A well known plant with drooping tail-like spikes of crimson flowers. Propagated by seeds. Common in tropics and temperate regions.

#### AMARANTUS HYPOCHONDRIACUS Linn.

FAM.—Amarantaceæ.

COM. NS. :—*E.* The Prince's Feather.

A very beautiful annual plant with crimson stems, leaves and upright plume-like crimson flowers. Propagated by seeds.

### AMARANTUS SALICIFOLIUS Hort Vaitch.

FAM.—Amarantaceæ.

A graceful plant, rather tall, with long, narrow, weeping leaves shaded bright orange-red. Propagated by seeds; cultivated.

### ANAGALLIS ARVENSIS Linn.

FAM.—Primulaceæ.

An annual herb; stem 4 angled; leaves opposite, gland-dotted; flowers solitary axillary, of deep blue colour with crimson eye; flowering from December to April. Grows wild by the side of irrigation channels. Propagated by seed. Worth growing in gardens.

### ANGELONIA SALICARIFOLIA Humb. & Boupl.

FAM.—Scrophulariaceæ.

A herbaceous plant, with lance-shaped toothed leaves, and bearing racemes of purplish-lilac irregular flowers. It grows on the bank of ponds and remains almost constantly in bloom. Propagated by cuttings. A native of Tropical America.

### ANTIRRHINUM MAJUS Linn.

FAM.—Scrophulariaceæ.

COM. NS. :—*E.* Snapdragon.

A perennial herb, but in India usually cultivated as an annual, a native of Mediterranean region. It is most ornamental when in flower, which is generally in late winter and hot season. Propagated by seeds. There are many varieties recently introduced both dwarf and tall.

### BEGONIA (Tourn) L.

FAM.—Begoniaceæ.

A very extensive genus, mainly S. American, of handsome leaved herbs. The species are divided into three groups, those cultivated for their foliage, those with handsome large flowers, and those with tuberous roots and handsome flowers. They are admirably suited for hanging baskets and rockeries. Easily propagated by cuttings of stems or from leaves containing a vein junction. Three species are indigenous in W. Ghats. There are over 200 varieties in cultivation.

### CALENDULA OFFICINALIS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Marigold.

A winter annual; it bears flowers of many colours from pale-straw to deep orange, single and double. It is grown everywhere in gardens. Propagated by seeds. A native of Mediterranean region,

## CALLISTEPHUS HORTENSIS Cass.

FAM.—Compositæ.

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Ornamental plants

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COM. NS. :—*E*. Chinese aster.

An annual plant, comprises several distinct varieties with flowers of nearly every colour; coming in bloom from January onwards. Nothing can surpass in beauty a group of them in full bloom. Propagated by seeds. A native of China and Japan.

## CANSCORA DIFFUSA R. Br.

FAM.—Gentianaceæ.

A much branched erect annual. Flowers, numerous, in lax, diffuse cymes; corolle tubular tube green, limb rosy; wild all over the State; flowers from October-January. Worth growing in gardens; suitable for rockery. Propagated by seeds.

Tropics.

## CANSCORA PERFOLIATA Lamk.

FAM.—Gentianaceæ.

An erect annual; stem 4 winged; Flowers in paniculate terminal cymes, usually in threes, rosy; flowering in February; wild in Konkan and N. Kanara. Worth growing in gardens; suitable for rockeries. Propagated by seeds.

## CELOSIA ARGENTEA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*M*. Kurdu.

An annual small plant, ·3-1 meter high. Leaves variable; floral bracts at first pinkish, afterwards glistening white, crowded in close cylindric terminal spikes. Flowering Oct.-Dec. Common everywhere in cultivated fields throughout the State.

*See* Sacred Plants, Famine Plants.

## CELOSIA CRISTATA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*E*. Cocks'-comb.

A plant similar to Celosia Argentea but develops under cultivation monstrous and curiously branched flower heads which are showy. Propagated by seeds.

*See* Oils.

### CHRYSANTHEMUM CARINATUM Schousb.

FAM.—Compositæ.

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An annual plant; bears daisy like floral heads with white and yellow rays and dark brown eye. There are two or three varieties. Propagated by seeds.

### CHRYSANTHEMUM INDICUM Linn.

FAM.—Compositæ.

COM. NS. :—*M.* Shevanti.

A common annual plant of this country; bears profusion of bright, golden-yellow middle-sized flowerheads. It is very showy when in full blossom in Nov-Dec. Propagated by cuttings. There is also a white variety.

### COREOPSIS ARISTOSA Michx.

FAM.—Compositæ.

A dwarf handsome annual, a native of America. Leaves deeply pinnatified; flower heads have yellow rays. Propagated by seeds.

### COREOPSIS TINCTORIA Nutt.

FAM.—Compositæ.

A well known tall handsome annual, a native of America. The flower heads have long yellow rays and a maroon coloured disk. It is a very common plant in the gardens. Flowering in rainy season. Propagated by seeds.

### COSMOS BIPINNATUS Cav.

FAM.—Compositæ.

An annual, about 60 cm. high, a native of Mexico; bears pretty pink daisy-like flowers. Flowering in the cold season. Propagated by seeds. There are now many fine varieties, early and late, tall and dwarf grown in the gardens.

### COSMOS TENUIFOLINS Lindl.

A slender leaved plant with its varieties is a charming annual for the rainy season.

### CYATHOCLINE LYRATA Cass.

FAM.—Compositæ.

A slender delicate annual herb. Stems branched; leaves pinnatified; flowers, rose-purple, in heads arranged in small rounded corymbose panicles. Flowers November-March; Usually met with on the banks of streams and in moist localities. Worth growing in gardens in moist regions. A native of India.

## DELPHINIUM AJACIS Linn.

FAM.—Ranunculaceæ.

COM. NS. :—*E.* Larkspur.

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An annual with much divided alternate leaves and showy racemes of blue flowers. Propagated by seeds. Common in North Temperate regions.

## DELPHINIUM DASYCAULON Fres.

FAM.—Ranunculaceæ.

COM. NS. :—*E.* Ghat Larkspur.

A very handsome herbaceous plant, with bright blue flowers, in loose racemes; Flowers in August-September. Rather rare plant; found wild near Junnar, Purandhar, Sinhagad, Torna and other hills in the Poona district. Worth growing in the gardens.

## DIANTHUS CARYOPHYLLUS Linn.

FAM.—Caryophyllaceæ.

COM. NS. :—*E.* Carnation *M.* Karanphul.

An annual herb with stem swollen at the nodes and linear leaves. Flowers of many colours cultivated as ornamental plants.

## DIANTHUS CHINENSIS Linn.

FAM.—Caryophyllaceæ.

COM. NS. :—*E.* China-pink.

An annual herb with stems swollen at the nodes and sessile linear leaves, a beautiful cold weather plant. Flowers of many colours cultivated.

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## EXACUM BICOLOR Roxb.

FAM.—Gentianaceæ.

COM. NS. :—*M.* Udichirayet.

An erect annual with quadrangular stem. Leaves very variable. Flowers showy in copious terminal cymes. The lower half of the corolla lobes white, the upper blue. Flowers in August-November; wild in pasture lands in Konkan, Mawal, Deccan, and S. M. Country; worth growing in gardens. Propagated by seeds.

*See* Medicinal Plants.

## EXACUM PUMILUM Griesb.

FAM.—Gentianaceæ.

A very small herbaceous annual with tetragonal stem. Leaves lanceolate. Flowers in lax cymes, bluish-purple, with prominent yellow anthers. A beautiful herb. Flowers in August-September. Pretty common in grasslands during the rains in Konkan and S. M. Country. Worth growing in gardens. Propagated by seeds.

### EXACUM TETRAGONUM Roxb.

FAM.—Gentianaceæ.

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An elegant herb resembling *E. bicolor,* but is distinguished by flowers with corolla lobes azure blue. Propagated by seeds.

### GAILLARDIA PULCHELLA Fouger.

FAM.—Compositæ.

A perennial tall herb. The ray flowers are crimson tipped with bright yellow. The ray and disk flowers develop into tubular funnel-shaped florets and form handsom flower heads. An improved form of this (*G. lorenziana*) is very handsome and unique in its appearance. American.

### GERBERA JAMIESONI Bolous.

FAM.—Compositæ.

An ornamental herb, a native of S. Africa, with flowers resembling Michelmas daisy, but orange-coloured and deeply lobed rather large leaves. Propagated by seeds.

### GOMPHRENA GLOBOSA Linn.

FAM.—Amarantaceæ.

COM. NS. :—*E.* Globe amaranth.

A tall branched annual with obovate-oblong leaves and large globose, yellowish-white or crimson heads of flowers, 2·5-4 cm. in diameter, with leafy bracts and pinkish purple bracteoles. Flowers in August-March.

### GYNANDROPSIS SPECIOSA DC.

FAM.—Capparidaceæ.

An elegent annual, 1 m. high, with large rosy flowers in terminal racemes, and digitate leaves with 7 leaflets. Grown as an ornamental plant in gardens. Propagated by seeds.

### HELIANTHUS ANNUUS Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Sunflower ; *M.* Suryaphul.

A tall annual with large yellow flowers ; very common in the gardens. Propagated by seeds.

*See* Fibres, Oils.

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## HELIANTHUS RIGIDUS Desf.

FAM.—Compositæ.

COM. NS. :—*E*. The small Sun-flower.

An annual, a native of N. W. America. The flower heads have ray florets of deep golden colour and disk flowers dark chocolate. Propagated by seeds.

## IMPATIENS BALSAMINA Linn.

FAM.—Balsaminaceæ.

COM. NS. :—*M*. Terada.

An annual, 30-90 cm. high; leaves long, alternate, lanceolate. Flowers rose coloured, showy. There are varieties with double flowers and different shades of colour from pure white to crimson. The garden may be kept gay throughout the year on balsams only.

*See* Oils.

## IMPATIENS PULCHERRIMA Dalz.

FAM.—Balsaminaceæ.

An erect annual, about 60 cm. high flowers violet purple, spur long curved. Flowers Sept.-Oct. Wild in shady jungles in Konkan. A very handsome plant worth growing in gardens.

## IMPATIENS SULTANA Hook f.

FAM.—Balsaminaceæ.

An erect rather succulent herb, having bright scarlet flowers, with spreading petals. It is really a beautiful object in conservatories, thriving among foliage plants and ferns.

## ISOTOMA LONGIFLORA Presl.

FAM.—Companulaceæ.

A small annual herb with long-stalked white flowers, a native of W. Indies. Grows very freely on moist rockeries in gardens. Propagated by seeds.

## KALANCHOE Adans.

FAM.—Crassulaceæ.

A genus of erect growing succulent herbs, growing up to 1·3 m., leaves green or fleshy-orange, mostly very irregular in size and form. Useful for rockeries.

The following species are worth growing. They are found growing wild in hills in the Deccan and S. M. Country.

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**KALANCHOE GLANDULOSA Hochst.**—Flowers yellow in dense paniculate cymes.

**KALANCHOE SPATHULATA DC.**—Flowers yellow in dense cymose panicles.

**KALANCHOE FLORIBUNDA W. & A.**—Flowers yellow, numerous in flat-topped corymbose cymes.

**KALANCHOE BHIDEI T. Cooke.**—Whole plant of reddish colour; flowers, pure white, numerous in cymose panicles.

### LOBELIA TRIGONA Roxb.

FAM.—Lobeliaseæ.

COM. NS. :—*M.* Karkholi.

A pretty more or less creeping small herb, with triangular stems and blue or violet coloured flowers. Flowers August-Oct. Wild at Neral, Mahabaleshwar, Panchagani, Londa.

### MENTHA ARVENSIS Linn.

FAM.—Labiatæ.

COM. NS. :—*M.* Pudina.

A perennial erect herb. Leaves variable in shape, toothed; flowers lilac in whorls. Planted in gardens all over the State. Temperate regions.

*See* Medicinal Plants, Condiments and spices.

### MONSONIA SENEGALENSIS Guill.

FAM.—Geraniaceæ.

A diffuse annual, clothed with glandular viscid hairs; leaves ovate, cordate; flowers showy pink with long penduncles. Flowers August. Throughout the dry districts of the State; hills near Poona.

### OENOTHERA ROSEA Ait.

FAM.—Onagraceæ.

A small pretty annual plant, a native of Mexico, is grown in gardens, especially on the hills, and thrives well at Mahabaleshwar. It is about 30 cm. high and has pink flowers with obovate petals.

### PARACARIUM MALABARICUM C. B. Cl.

FAM.—Boraginaceæ.

COM. NS. :—*M.* Kala-nisurdi.

An erect branched herb, ·3–1·0 m. high. Leaves radial and cauline; flowers small, uniform blue in many terminal racemes forming a dense corymb. Flowers Oct.-Nov.

## PETUNIA NYCTAGINIFLORA Juss.

FAM.—Solanaceæ.

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An annual of compact habit, with white flowers about 5 cm. in expansion, sweet-scented.

## PETUNIA VIOLACEA Lindl.

FAM.—Solanaceæ.

An annual of compact habit, with small purplish violet flowers.

These two species are natives of Argentine, grown in gardens all over. They are the originals of the many double and brightly coloured garden forms which are in cultivation in gardens. Propagated by seeds, sets or layers.

## PORTULACA GRANDIFLORA Hook.

FAM.—Portulacaceæ.

A very low growing fleshy herb. There are many varieties both with single and double flowers, and also the brilliancy and variety of colours. Nothing is more beautiful as an overhanging for plant tubs. Propagated by seeds.

## SAPONARIA VACCARIA Linn.

FAM.—Caryophyllaceæ.

COM. NS. :—*M.* Sabani.

A tall robust annual; flowers in corymbose dichotomous cymes, sepals with 5 broad green veins, petals clawed, rosy. Flowers Feb. A weed of cultivation. Ornamental when grown in clumps and blossoming in great profusion.

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## SESAMUM INDICUM Linn.

FAM.—Pedaliaceæ.

COM. NS. :—*M.* Til.

A pretty annual, bearing large tubular, white or rose coloured flowers. It deserves a place in the ornamental gardens, though it is cultivated on a large scale for its oily seeds. Flowers Aug.-Sept.

*See* Medicinal Plants, Oils.

## SWERTIA DECUSSATA Nimmo.

FAM.—Gentianaceæ.

COM. NS. :—*M.* Kadu.

An erect annual; stem densely leafy, more or less 4-winged. Leaves broadly ovate, flowers very numerous, white with blue veins, in dense clusters. Flowers October-January. Western Ghats, Mahabaleshwar, Panchagani.

*See* Medicinal Plants.

SECTION 16.

Ornamental plants. Annuals.

### TAGETUS ERECTA Linn.

FAM.—Compositæ.

COM. NS. :—*E.* African. Marigold ; *M.* Zendu ; Makhamal.

A small plant with erect stem and erect branches. Flowers, handsome, showy, yellow. There are many varieties some with flowers as large and as double as ordinary sized Dahlias. Flowers in Sept.-Nov.

*See* Medicinal Plants.

### TAGETUS PATULA Linn.

FAM.—Compositæ.

COM. NS. :—*E.* Marigold. *M.* Zendu, Makhamal.

A smaller plant than the above with smaller flowers. Propagated by seeds.

### TELANTHERA FICOIDEA Moq.

FAM.—Amarantaceæ.

A small plant. Its leaves take a fine crimson colour from July to September. A favourite edging plant in the gardens. Native of Tropical America.

### TORENIA ASIATICA Linn.

FAM.—Scrophulariaceæ.

A diffusely branched annual. Flowers 2-lipped, bluish-purple with dark-violet lateral lobes. It makes a pretty basket plant in a moist conservatory. Propagated by cuttings. Tropical.

### TORENIA BICOLOR Dalz.

FAM.—Scrophulariaceæ.

An annual with creeping stem. Flowers 1-3 together, 2-lipped, upper lip rounded, violet, lower lip 3-fid, white ; Flowers July. This plant much resembles the species Torenia Asiatica.

### TORENIA FOURNIERI Linden.

FAM.—Scrophulariaceæ.

An erect annual, native of Cochin-China. Flowers showy, purple, with broadly winged calyx.

## TRADESCANTIA DISCOLOR L'herit.

FAM.—Commelinaceæ.

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A herbaceous plant; leaves large, upright, narrowly lanceolate, sheathed at the base, green above and purple beneath; flowers blue or purple almost included within the bracts. It is a striking plant. Propagated by offsets.

## TROPAEOLUM MAJUS Linn.

FAM.—Tropacolaceæ.

COM. NS. :—*E.* Nasturtium ; Gardencress.

A beautiful and showy annual; leaves having a form of a buckler and the flowers resemble an empty helmet.

There are many varieties. Some are dwarf, some are more or less climbing, producing flowers of various shades, pale straw-colour, orange, scarlet, dark crimson, spotted and striped. Propagated by seeds. A native of South America.

## ZINNIA ELEGANS Jacq.

FAM.—Compositæ.

A most beautiful annual with varieties bearing large, gay crimson, scarlet, straw-coloured flowers, forming quite a garden by themselves for a very long season. There is also a double variety. Propagated by seeds.

## AQUATICS.

**Aquatics.**

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## EICHHORNIA CRASSIPAS Sobrus.

FAM.—Pontederiaceæ.

COM. NS. :—*E.* water **Hyacinth, Lilac Devil.**

An upright south American floating herb. Leaves with large swollen petioles ; leaves erect panicles of beautiful mauve or lilac flowers. Grown in garden tanks, for its flowers ; a floating troublesome water-weed sometimes blocking rivers and water ways.

## LIMNANTHEMUM INDICUM Thw.

FAM.—Gentianaceæ.

COM. NS. :—*M.* Kumud.

An aquatic floating herb with horizontal rhizome, with petiole like branches producing nodes, from which starts a tuft of roots, a cluster of flowers, a single floating leaf orbicular and cordate ; flowers white with a yellow centre. Flowers Apr.-Sept. In tanks throughout the State. Propagated by rhizomes.

SECTION 16.

Ornamental plants. Aquatics.

### NELUMBO NUCIFERA Gaertn.

FAM.—Nymphacaceæ.

COM. NS. :—*E.* Indian Sacred Lotus ; *M.* Kamal.

A large aquatic herb with long, slender creeping stem rooting at the nodes. Leave ·3—·6 m. in diam., orbicular, cupped, petioles very long; flowers solitary, large, white or rosy, with many petals. Flowers July. Cultivated in tanks in the State. Propagated by seeds or tubers.

*See* Medicinal Plants, Sacred Plants.

### NYMPHAEA PUBESCENS Willd.

FAM.—Nymphacaceæ.

COM. NS. :—*E.* Lotus ; *M.* Lalkamal.

A large acquatic herb, root-stock tuberous. Leaves small orbicular or reniform, dentate ; petioles very long submerged ; flowers smaller, red, pale-rose or white, opening in the morning only. Flowers all the year. Cultivated in many places in the State. Propagated by seeds or tubers.

*See* Medicinal Plants.

### NYMPHAEA STELLATA Willd.

FAM.—Nymphacaceæ.

COM. NS. :—*M.* Uplya-kamal.

An aquatic herb with ovoid root-stock. Leaves orbicular, with a narrow sinus, often bloched with purple beneath ; petioles long submerged ; flowers rather large, usually pale-violet, light blue or purple, faintly fragrant. Cultivated in the State. Propagated by seeds or tubers.

## BULBOUS AND TUBEROUS PLANTS.

### ACHIMENES P. Br.

A genus of herbaceous, tuberous-rooted, showy flowering plants; flowering during the rains, flowers with mauve, white, purple, pale-blue shades; suitable for hanging pots and shady borders; propagated by tubers.

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**Ornamental plants**
**Bulbous and tuberous plants.**

### ACHIMENES HIRSUTA D C.

FAM.—Gesneriaceæ.

A small hairy plant; a native of Brazil. Flowers reddish, with yellow eye and spotted throat.

### AGAVE AMERICANA Linn.

FAM.—Amaryllidaceæ.

COM. NS. :—*E*. American aloe; *M*. Ghayapat.

A stout shrubby rhizomatous perennial plant, with very stout, commonly variegated thick, fleshy long leaves. Cultivated in gardens as an ornamental and mostly as a hedge plant. Propagated by suckers and bulbils.

*See* Medicinal Plants.

### ALPINIA ALLUGHAS Roscoe.

FAM.—Zingiberaceæ.

COM. NS. :—*M*. Taraka.

A stout perennial herb with stout tuberous, aromatic roots, leaves lanceolate polished; flowers large, numerous in succession, of a beautiful rose-colour, inodorous. Flowering in the beginning of the rainy season. Propagated by division of rhizomatous roots; Found in S. Konkan. Worth growing in gardens.

### ALPINIA NUTANS Roscoe.

FAM.—Zingiberaceæ.

COM. NS. :—*M*. Nag-damani, Puna-champa.

A very handsome tall plant, a native of the East Himalayas, Burma. Leaves long. Flowers in long panicles. Corolla white with a tinge of pink, the lip beautifully variegated with red and yellow. In blossom, generally, most of the year, thrives well in swampy ground. Propagated by division of rhizomes.

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### ANTHURIUM Schott.

FAM.—Araceæ.

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It is a tropical American genus of more or less epiphytal growth, with hermaphrodite flowers, densely arranged on spadices, often with brilliantly coloured spathes, Leaves leathery, large, more or less heart shaped, with a strong stalk, curved at the apex and often of brilliant metallic hues, relieved by prominent ribs and veins. They are moisture and shade loving. They are handsome and form most striking features of green houses with their large ornamental leaves. Propagated easily by cuttings; also by seeds. There are a large number of species cultivated in the gardens.

### ASPARAGUS RACEMOSUS Willd. *Var.* JAVANICAM Baker.

FAM.—Liliaceæ.

COM. NS. :—*M.* Shatavari.

Extremely scandent, spinous undershrub with tuberous root-stock; flowers white, fragrant in simple racemes. Wild in dry deciduous and monsoon forests in the State. Cultivated in gardens for its graceful feathery foliage and fragrant white flowers.

*See* Medicinal Plants.

### BEGONIA CONCANENSIS A. DC.

FAM.—Begoniaceæ.

A succulent, small, tuberous rooted plant; bears a few handsome rosy flowers on elongate peduncles; wild in Konkan, Ghats and Lonawala. Worth cultivating in gardens.

### BEGONIA TRICHOCARPA Dalz.

FAM.—Begoniaceæ.

A succulent, small, tuberous-rooted plant; bears handsome white flowers, 4-6 at the end of the peduncle; wild in Konkan and Kanara. Worth cultivating in gardens.

### CALADIUM Vent.

FAM.—Araceæ.

A genus of tuberous-rooted plants, native of Brazil, leaves large arrow-headed rich-green, spotted and bloched with white, pink, rose and red. They are shade and shelter loving and are striking objects between May and October. Propagated by young offsets. Most of the varieties cultivated are hybrids of *caladium bicolour Vent.*

### CALATHEA G. F. W. May.

FAM.—Marantaceæ.

A genus closely allied to Maranta. It contains many beautiful leaved plants. Propagated by division of tuberous roots.

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**Ornamental plants, Bulbous and tuberous plants.**

### CANNA L.

FAM.—Cannaceæ.

A genus of numerous handsome leaved tuberous-rooted plants bearing brilliant flowers varying from white, pale yellow to deep crimson. They have large lanceolate leaves 1-2 m. high. Admirable as plants in wet soil round tanks and pools, in well watered beds under light shade or in pots in sheltered places. A number of varieties are grown in the gardens. Propagated by division of root-stock.

### CANNA INDICA Linn.

FAM.—Cannaceæ.

COM. NS. :—*E.* Indian Shot; *M.* Kardali.

A perennial herb with tuberous root stock; bears small but vivid red and yellow flowers. Found almost everywhere constantly in blossom.

*See* Medicinal Plants, Fibres.

### CHLOROPHYTUM TUBEROSUM Baker.

FAM.—Liliaceæ.

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COM. NS. :—*M.* Kulai.

A small tuberous herb; leaves long with wavy margins; flowers white in short branched racemes; in bloom in July; wild in Konkan and round about Poona in pasture lands. Worth growing in gardens for its wavy leaves and white flowers. Propagated by tubers.

*See* Sacred Plants.

### COSTUS SPECIOSUS Smith.

FAM.—Zingiberaceæ.

COM. NS. :—*M.* Koshi.

A tall erect tuberous-rooted plant; leaves large dark rich-green, lanceolate; flowers large white, numerous in very dense spikes; bracts bright red. A Common plant growing wild in swampy places in Konkan, Deccan and S. M. country. Flowering Aug.-Oct. When in blossom a most beautiful object due to the delightful combination of colours. An excellent plant in the neighbourhood of tank or pool in the gardens.

### CURCULIGO ORCHIOIDES Gaertn.

FAM.—Amaryllidaceæ.

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COM. NS. :—*M*. Kali-musali.

A herb with a stout root-stock. Leaves long, linear; flowers rather small, bright yellow; wild in the Konkan, Deccan and Mahabaleshwar. Propagated by offsets and seeds. Worth growing in the fernery or palm house.

*See* Medicinal Plants.

### CURCULIGO RECURVATA Dryand.

FAM.—Amaryllidaceæ.

A herb with stout root-stock; a native of Tropical Himalayas, Bengal, Burma; leaves large, lanceolate; flowers yellow in heads. There are many variegated forms. Grown as a hot-house plant. Propagated by offsets and seeds.

### CURCUMA L.

FAM.—Zingiberaceæ.

A genus of plants with ginger-like roots, sending up naked thick spikes of flowers, the principal beauty of which consists in the large gorgeous bracts. Leaves oblong, often very large. Propagated by rhizomes.

The following species are ornamental.

### CRINUM ASIATUCUM Linn.

FAM.—Amaryllidaceæ.

COM. NS. :—*M*. Nagdauna.

A herb with tunicated bulb; leaves linear, long, bright-green. Flowers large, 15-50 in an umbel, white, fragrant at night; found wild in the Konkan; often cultivated in gardens in the State. Propagated by bulbs.

*See* Medicinal Plants.

### CRINUM DEFIXUM Ker-Gawl.

FAM.—Amaryllidaceæ.

A bulbous herb; leaves linear, deeply channelled, thick, dark-green. Flowers large, 6-12 in an umbel, white, fragrant at night, found wild in Konkan and S. M. country. Worth growing in the gardens as an ornamental plant. Propagated by bulbs.

*See* Famine Plants,

## CRINUM LATIFOLIUM Linn.

FAM.—Amaryllidaceæ.

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A herb with a large bulb, leaves many, long, linear, bright-green. Flowers large, 10-20 in an umbel, white streaked with purple down the middle, fragrant; wild in the Konkan, Deccan, Lonavala and Kanara. Propagated by bulbs. Worth growing in gardens as an ornamental plant.

## CURCUMA AMADA Roxb.

FAM.—Scitamineæ.

COM. NS. :—*E.* Mango-ginger; *M.* Ambe halad.

Flowering bract greenish white, bract of the coma tinged with red or pink. Wild in Konkan and Gujarat. Often cultivated. Flowers-September.

*See* Medicinal Plants.

## CURCUMA AROMATICA Salish.

FAM.—Scitamineæ.

COM. NS. :—*M.* Ran-halad.

Flowers fragrant; bracts of the coma tinged with red or pink; wild in moist shady places in the forests of the Konkan and N. Kanara. Flowers in May.

*See* Medicinal Plants, Dyes and Tans.

## CURCUMA NEILGHERRENSIS Wight.

FAM.—Scitamineæ.

Flowers bright yellow; flowering bracts pale-yellowish green; bracts of the coma, pink; wild in Konkan, Deccan, Sinhagad near Poona, S. M. country. Flowers during dry season or shortly after spring showers.

## CURCUMA ZEDOARIA Rose.

FAM.—Scitamineæ.

COM. NS. :—*M.* Kachora.

Flowers yellow; flowering bracts green tinged with red; bracts of the coma crimson or purple; cultivated. Flowers in April.

*See* Medicinal Plants, Oils, Dyes and Tans.

## DAHLIA VARIABILIS Desf.

FAM.—Compositæ

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tuberous plants.

A tuberous-rooted annual plant with beautiful showy flowers, several varieties of which, with different beautiful colours, are grown in gardens; in bloom generally in July-September.

Three distinct forms are recognised of this flowers (1) double (2) Single (3) Cactus. Double varieties produce large globose flowers and are propagated by tubers. Single and cactus forms are remarkable for profusion of bloom combined with brilliant colours. These are grown from seed. Recently propagation by cuttings is also done.

## GESNERIA DOUGLASII Lindl.

FAM.—Gesneriaceæ.

A handsome herbaceous plant, a native of Brazil. Leaves in a whorl about 15 cm. from the ground, ovate, crenate-serrate, downy with a fine gloss on each side. Flowers tubular, pink or orange, striped and bordered with blood-red spots. Propagated by suckers.

## GLOXINIA MACULATA L'Herit.

FAM.—Gesneriaceæ.

A strong-growing plant, a native of S. America. Leaves radial, heart-shaped, smooth and green above and reddish beneath, and the cauline leaves ovate. The flowers, large, pale-blue, widely tubular, in a raceme. Flowers profusely in Oct.-Nov. Propagated by seeds or tubers.

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## HEDYCHIUM CORONARIUM Koeniq.

FAM.—Zingiberaceæ.

COM. NS. :—*M.* Sonatakka.

A tall herb with stout horizontal fleshy root-stock. Leaves long lanceolate. Flowers large, tubular pure white very fragrant, in dense spikes. Flowers August-September. Wild in Konkan, Deccan and Kanara. Grown in Gardens.

*H. flavoum Roxb.* has lemon yellow fragrant flowers.

## IMPATIENS ACAULIS Arn.

FAM.—Balsaminaceæ.

A tuberous rooted perennial. Leaves radial, variable in size and shape; flowers pink, in racemes 2·5—10 cm. long. Flowers Sept.-Nov.; a very beautiful plant found on wet rocks on hills in Konkan and Deccan. Very common at Mahabaleshwar.

## KAEMPFERIA ROTUNDA Linn.

FAM.—Zingiberaceæ.

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**Ornamental plants Bulbous and tuberous plants.**

COM. NS. :—*M.* Bhui-champa.

A stemless plant with a tuberous rootstock. Leaves few, large oblong, mottled-green above, pale red-purple beneath. Flowers sweetly fragrant of various shades of purple and white appearing in April before the leaves. Cultivated. Propagated by tubers.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons.

## MARANTA Plum. ex-L.

FAM.—Marantaceæ.

A genus of tropical plants, with tuberous roots; remarkable for the highly ornamental character of their leaves. They thrive well in moist shady places. There are several varieties grown in the gardens. Propagated by tubers.

## MIRABILIS JALAPA Linn.

FAM.—Nyctaginaceæ.

COM. NS. :—*E.* Four O'clock plant; *M.* Gulbas.

A herbaceous tropical American plant with large perennial tuberous root. Leaves cordate; flowers large, salver-shaped to campanulate, brightly coloured (dark crimson, yellow, white or crimson striped with white yellow) always in bloom. Grown all over as an ornamental plant.

*See* Medicinal Plants.

## OXALIS BOWIEI Lindl.

FAM.—Oxalidaceæ.

A small very beautiful bulbous plant, with large handsome 3-foliate leaves. Flowers deep rose-coloured, born in heads. Throughout the cold season. Propagated by bulbs.

## PANCRATIUM TRIFLORUM Roxb.

FAM.—Amaryllidaceæ.

A herb with a bulb. Leaves thin, long, linear-lanceolate; flowers rather large fragrant, 3-8 in an umbel. Flowers May-June; wild at Mahabaleshwar and Sinhagad.

## POLIANTHES TUBEROSA Linn.

FAM.—Amaryllidaceæ.

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COM. NS. :—*E*. Tuberose ; *M*. Gulchabu.

A bulbous plant about 1 m. high ; a native of Maxico. Leaves linear, radial or on the lower part of the stem. Flowers white, funnel-shaped, very fragrant, in long terminal raceme. Flowers throughout the year. Propagated by bulbs. There is a double variety also.

*See* Oils.

## SANSEVIERIA CYLINDRICA Boj.

FAM.—Liliaceæ.

COM. NS. :—*E*. The terete Bow-string Hemp.

A perennial herb with tuberous root stock. Leaves terete, quite solid ; flowers cream-white tinged with pink, in fascicles along a long rachis. Cultivated in gardens.

## SANSEVIERIA ZEYLANICA Willd.

FAM.—Liliaceæ.

COM. NS. :—*E*. Bow-string Hemp.

A perennial with short stem and tuberous root-stock. Leaves narrow, long, rigid, thick, pale-green with transverse bands of dark-green, with a spine-like tip ; flowers greenish-white tinged with violet, in fascicles on long racemes. Cultivated in gardens.

*See* Fibres.

## ZEPHYRANTHES ROSEA Lindl.

FAM.—Amaryllidaceæ.

A small bulbous plant with narrow shining green, long, leaves. It bears lily-like large flowers, one on a scape, rose coloured. These plants burst suddenly into bloom about three times yearly. They make a good border ; very useful for a ground-work of a large bed with choice shrubs planted widely apart. Native of America.

## CLIMBERS.

### ALLAMANDA CATHARTICA Linn.

FAM.—Apocynaceæ.

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**Climbers.**

A rather large shrub of scandent and rambling habit; a native of America, probably inroduced into Bombay by the Portuguese (Dalzell). It has very large pure bright yellow flowers, finely relieved by the rich deep-green leaves 4 in a whorl; in constant blossom during the hot and rainy seasons. Propagated by layers.

### ANODENDRON PANICULATUM A. DC.

FAM.—Aopcynaceæ

COM. NS. :—*M.* Lambtani.

A very large woody twining shrub; leave elliptic, oblong, 8-15 × 3·5-6 cm., shining. Flowers yellow, small, numerous, in large lax branched terminal and axillary cymes; common on the Ghats in Konkan and Deccan. Worth growing in the gardens.

*See* Fibres.

### ANTIGONON LEPTOPUS Hook. & Arn.

FAM.—Polygonaceæ.

COM. NS. :—*E.* Sandwitch--Island Climber.

A lovely tropical American creeper, with ample large sprays of beautiful pink flowers. It is in blossom throughout the rains and cold season.

A white flowered variety is also cultivated. Propagated by seeds, cuttings, and layers during the rains.

### ARGYREIA SPECIOSA Sweet.

FAM.—Convolvulaceæ.

COM. NS. :—*E.* Elephant creeper; *M.* Samudrashok.

A very large climber with great roundish heart-shaped leaves, silvery tomentose beneath; it has large beautiful rose-purple, funnel-shaped flowers. Found wild in Konkan and Deccan near villages. Cultivated in gardens for its leaves and flowers. Propagated by seeds.

*See* Medicinal Plants.

### ARISTOLOCHIA BRASILIENSIS Mart. & Zuce.

FAM.—Aristolochiaceæ.

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COM. NS. :—*M.* Popat-vel.

A climber, a native of Brazil, with curious flowers, the upper lip of which with its inflated tube resembles the head and beak of a bird. Propagated by seeds, cuttings or layers.

### ARISTOLOCHIA ELEGANS Masters.

FAM.—Aristolochiaceæ.

A small free flowering species, a native of Brazil, with cordate leaves. The flowers have a slightly deflated tube, which is suddenly bent upwards; the upper part dilated into cordate cup-shaped limb of rich purple colour ornamented with creamy white markings and having a golden yellow eye surrounded by rich velvety purple.

Many other Aristolochia species are grown for their peculiar shaped flowers.

### BEAUMONTIA GRANDIFLORA Wall.

FAM.—Apocynaceæ.

A gigantic mangificient climber, a native of Nepal, has obovate-oblong large leaves and showy white very large flowers. Grown as an ornamental plant in gardens and easily propagated by seeds, cuttings, and layering; in bloom from December-March.

*See* Fibres.

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### BEAUMONTIA JERDONIANA Wight.

FAM.—Apocynaceæ.

A large climbing free flowering shrub; it has very large, funnel-shaped, white flowers in terminal rusty hairy cymes; in bloom in November-December, wild in the Konkan and evergreen forests of N. Kanara.

Propagated by seeds and layers.

### BIGNONIA INCARNATA Aubl.

FAM.—Bignoniaceæ.

A climbing woody shrub with smooth shining leaves terminal, leaflets transformed into tendrils; bears tubular flowers, pale-lilac veined with deep purple; the tube white inside. It is a native of British Guinea, and is propagated by layerings. Flowering in hot months.

## BIGNONIA MAGNIFICA Bull.

FAM.—Bignoniaceæ.

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A free flowering plant of scandent habit, a native of British Columbia. The flowers, which are produced in large branching panicles, are of great size, of delicate mauve at opening, changing to rich crimson later, with a throat of light crimson colour. Perhaps the loveliest Bigonia in cultivation. Propagated by layers or cuttings.

## BIGNONIA UNGUIS-CATI Linn.

FAM.—Bignoniaceæ.

A very beautiful climber which clings to stone-work by small hooked tendrils. It bears a profusion of bright tubular yellow flowers during the hot season. Propagated by cuttings or layers.

## BIGNONIA VENUSTA Ker-Gawl.

FAM.—Bignoniaceæ.

A climbing shrub spreading over vast space. The lower leaves are 3-foliate, the terminal leaflets of upper leaves is transformed into a tendril. The flowers are tubular, long, orange-red, borne in crowded drooping clusters. Blooming profusely in January and February. Propagated by layers.

## BOUGAINVILLAEA GLABRA Choisy.

FAM.—Nyctaginaceæ.

A climbing shrub of weakly growth and almost free from spines. It bears small flowers supported by bracts of brilliant mauve colour. Flowers more or less throughout the year. A native of Brazil. Propagated by layers.

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## BOUGAINVILLAEA SPECTABILIS Willd.

FAM.—Nyctaginaceæ.

A large thorny extensively climbing shrub, a native of Brazil, bearing in the cold season a profusion of small pale-yellow flowers supported by large purple or magenta coloured bracts, which render the plant a most conspicuous object. Useful in gardens as a covering to trellises, archways, etc. Propagated by seeds, cuttings and layers.

There are many other varieties of Bougainvillaea grown in the gardens now-a-days.

## CARDIOSPERMUM HALICACABUM Linn.

FAM.—Sapindaceæ.

**SECTION 16.**

**Ornamental plants.** Climbers.

COM. NS. :—*E.* Balloon-vine; *M.* Kapal-phodi.

An annual or perennial tendril bearing, climbing herb; leaves deltoid, flowers small, white; capsule bladdery. Common in hedges throughout the State. Worth growing in gardens for its graceful foliage and numerous bladdery capsules. Propagated by seeds. Tropical.

*See* Medicinal Plants, Famine Plants.

## CISSUS DISCOLOR Bl.

FAM.—Vitaceæ.

COM. NS. :—*M.* Telitsayal.

A very choice, slender, creeping plant, with foliage of exquisite beauty. Leaves rather large, ovate, oblong, bloched with white above, deep-red and shining beneath; flowers red, very small. Very handsome plant when grown in shade and conservatories. Wild in W. Ghats and moist forests in N. Kanara.

## CISSUS QUADRANGULARIS Linn.

FAM.—Vitaceæ.

COM. NS. :—*M.* Kandvel.

A climber with quadrangular fleshy, very long stem; tendrils long. Leaves reniform or lobed. Leafless when old. Flowers very small. Throughout the driest districts of the State. Occasionally grown in gardens.

*See* Fibres.

## CLEMATIS GOURIANA Roxb.

FAM.—Ranunculaceæ.

COM. NS. :—*M.* Morvel

A large climbing shrub with pinnate leaves; flowers small in much-branched panicles, yellowish or greenish-white; in bloom in Oct.-Nov. Common on the Ghats in thickets, in Konkan and Deccan. Worth growing in gardens. Propagated by layers.

## CLEMATIS SMILACIFOLIA Wall.

FAM.—Ranunculaceæ.

A woody climber, flowers in large axillary panicles; with sepals spreading, clothed outside with velvety brown hairs, purple inside. Flowering in October. Found wild in Konkan, Deccan and N. Kanara.

## CLEMATIS TRILOBA Heyne.

FAM.—Ranunculaceæ.

COM. NS. :—*M.* Morvel, Ranjai.

**SECTION 16.**

**Ornamental plants Climbers.**

An extensive climber, but often found trailing amongst grass; leaves simple or three lobed. Flowers white, in axillary panicles, sweet smelling. In bloom from Sept.-Nov. Very common throughout the Konkan and Deccan. A charming climber, suitable for covering an arch. Propagated by seeds and layering.

*See* Medicinal Plants.

## CLERODENDRON THOMSONAE Balf.

FAM.—Verbenaceæ.

A climbing shrub; a native of Tropical Africa, with large ovate leaves and tubular flowers with white pentagonal sepals, and light crimson petals. Flowering Sept.-Dec. Propagated by cuttings.

## CLITORIA TERNATEA Linn.

FAM.—Papilionoideæ.

COM. NS. :—*M.* Gokarni.

A perennial beautiful twining herb with inparipinnate leaves; flowers large axillary, solitary with bright blue or white standard, and orange centre. Common in hedges everywhere throughout the State. Flowering from June-Jan. Popagated by seeds.

*See* Medicinal Plants, Oils.

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## COMBRETUM COCCINEUM Lamk.

FAM.—Combretaceæ.

An elegant climber, a native of Madagascar and the Mauritius. Very beautiful on account of its dark-green shining foliage and the flowers which are produced in dense elegant racemes of brilliant scarlet colour. Propagated by layers.

## ELAEAGNUS LATIFOLIA Linn.

FAM.—Elaeagnaceæ.

COM. NS. :—*M.* Ambgul.

A large, usually scandent shrub, often running over high trees, leaves numerous, variable; flowers many in a cluster, straw-coloured; all parts covered with silvery scales. Flowers Nov.-Jan. Wild in Konkan, all along Ghats, S. M. Country, Kanara. Propagated by seeds. Elegant under lamplight in the gardens.

### FICUS HETEROPHYLLA Linn *Var.* Repens.

FAM.—Moraceæ.

**SECTION 16.**

**Ornamental plants. Climbers.**

COM. N. :—*E.* Indian Ivy.

A lovely creeping plant with small verdant heart-shaped leaves that cover a low wall in the shade or the trunk of a tree with a dense mantle of green, adhering by means of its numerous rootlets.

### FITTONIA ARGYRONEURA E. Coem.

FAM.—Acanthaceæ.

A creeping undershrub; a native of Peru, with broad flat elliptic vivid green leaves, 7·5-10 cm., transvered by a network of pure white veins.

### GLORIOSA SUPERBA Linn.

FAM.—Liliaceæ.

COM. NS. :—M. Kallavi, Khadyanag.

A herbaceous tall branching climber with tuberous roots. Leaves with tips ending in a tendril. Flowers large, solitary, perianth segments linear with wavy margins, colours changing from greenish, yellow, orange, scarlet to crimson according to age. Flowers July-Oct. Common in forests and low jungles throughout the State. Planted in gardens.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons.

### HEPTAPLEURUM VENULOSUM Seem.

FAM.—Araliaceæ.

A large climbing shrub with slender stem and striking bold palmate compound leaves, having elliptic leaflets on long stalks. The foliage is ornamental; wild in evergreen forests of Konkan and N. Kanara.

### HIPTAGE BENGHALENSIS Kurtz.

FAM.—Malpighiaceæ.

A large woody climbing shrub, young parts silky, leaves large, elliptic-oblong; flowers white, fragrant in erect racemes; fruits 3-winged. Flowers.—Jan.-March. Grows abundantly on W. Ghats. Grown in gardens.

*See* Medicinal Plants.

**SECTION 16.**

**Ornamental plants**
Climbers.

### IPOMOEA BONA-NOX Linn.

FAM.—Convolvulaceæ.

COM. NS.—*E.* Goodnight Flower; *M.* Gulchandani.

A large twiner climbing to a great height; leaves large, cordate; flowers large, tubular, pure white, fragrant, which open in the evening and wither before noon the next day; Flowers Oct.-Nov.; Found near houses and villages; also cultivated. Propagated by seeds.

### IPOMOEA CAMPANULATA Linn.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Tamber-vel.

A large climber, leaves large, thick, suborbicular; flowers large, tubular, pale-violet, dark-purple within the tube, in many flowered cymes; Flowers Oct.-Mar. Wild in hills of Konkan and Deccan.

### IPOMOEA DASYSPERMA Jacq.

FAM.—Convolvulaceæ.

A twiner with pedately – divided leaves, and large sulphur – yellow flowers with a purple tube; Cultivated in gardens. Propagated by seeds.

### IPOMOEA LEARI Paxt.

FAM.—Convolvulaceæ.

A handsome twiner, a native of Tropical America, a favourite ornament of verandah and trellises. It has large dark-blue flowers which become reddish as they fade.

### IPOMOEA LONGIFLORA R. Br.

FAM.—Convolvulaceæ.

An extensive climber, leaves large, broadly ovate, cordate, flowers tubular, white, very large. Flowers Sept.-Nov. Wild near the seacoast; often cultivated.

### IPOMOEA MURICATA Jacq.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Gariya.

A large twiner, stems muricate; leaves broadly ovate, cordate, large; flowers tubular, large, rose-purple. Flowers Sept.-Nov. Growing wild on rubbish and waste lands all over. Sometimes cultivated.

### IPOMOEA NIL Roth.

FAM.—Convolvulaceæ.

SECTION 16.

Ornamental plants.
Climbers.

COM. NS. :—*E.* Morning glory; *M.* Nil-vel.

An annual twining herb. Leaves obovate-cordate, deeply three-lobed. Flowers tubular, blue, tinged with pink. Grown in gardens all over.

*See* Medicinal Plants.

### IPOMOEA PALMATA Forsk.

FAM.—Convolvulaceæ.

COM. NS. :—*E.* Railway creeper; *M.* Garvel.

A perennial twiner with many stems; leaves small, palmately cut; flowers medium sized, widely funnel-shaped, dull-violet with a purple tube. In flower most of the year; wild in Konkan and Kanara. Often cultivated. Propagated by cuttings.

### IPOMOEA PURPUREA Roth.

FAM.—Convolvulaceæ.

A very showy twining plant, often grown to ornament trellises. Its flowers are of every shade from nearly white to dark purple.

### IPOMOEA QUAMOCLIT Linn.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Ganesh-puspha, Kamalata.

A handsome twining annual, a native of Tropical America. Leaves pinnate with numerous filiform segments; flowers tubular, small, bright-red very common in gardens throughout the State.

### IPOMOEA RUBRO-CAERULEA Hook.

FAM.—Convolvulaceæ.

COM. NS. :—*E.* Morning-glory.

A perennial handsome twiner, a native of Mexico, with large blue or white flowers; often cultivated in gardens. Propagated by seeds.

### JACQUEMONTIA VIOLACEA Choisy.

FAM.—Convolvulaceæ.

A perennial slender climbing plant, suitable for covering a trellis or arbour. It has small blue coloured trumpet-shaped flowers. Propagated by seeds or cuttings.

## JASMINUM AURICULATUM Vahl.

FAM.—Oleaceæ.

**SECTION 16.**

**Ornamental plants. Climbers.**

COM. NS. :—*M.* Jui.

A scandent or climbing shrub of the tropics. Leaves 3-foliate, the two lateral leaflets very small, sometimes wanting; flowers pure white, very fragrant, in compound, many flowered, lax cymes. Fowers July-Oct. Wild in Konkan and S. M. Country. Cultivated in gardens for its flowers. Propagated by cuttings.

## JASMINUM CALOPHYLLUM Wall.

FAM.—Oleaceæ.

COM. NS. :—*M.* Sayali.

A very beautiful shrub of climbing habit, a native of the Nilgiris, leaves trifoliate; flowers pure white 2·5 cm. across, with 10 petals. Flowers practically all the year round.

*See* Oils.

## JASMINUM MALABARICUM Wight.

FAM.—Oleaceæ.

COM. NS. :—*M.* Kusar.

A large climbing shrub. Stem very thick. Leaves opposite, broadly ovate; flowers, white, fragrant, in lax compound, many-flowered cymes. Flowers March-May. Common in Konkan, Matheran, Deccan and Mahabaleshwar.

## JASMINUM ODORATISSIMUS Linn.

FAM.—Oleaceæ.

A climbing shrub. Leaves alternate, pinnate, flowers yellow with 5-lobes, fragrant. Grown in gardens.

## JASMINUM OFFICINALE Linn.

FAM.—Oleaceæ.

COM. NS. :—*E.* White jasmin; *M.* Jai.

A climbing shrub, a native of Kashmir, Afghanistan and Persia, leaves opposite, pinnate. Flowers white, very fragrant. Corolla lobes 4-5. Flowers July-Sept. Propagated by cuttings.

*See* Oils.

### JASMINUM PRIMULINA.

FAM.—Oleaceæ.

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**Ornamental plants.** Climbers.

COM. NS. :—*M.* Pivali-jui.

A scandent or climbing shrub with 3-foliate leaves, nearly of equal size and shape. Flowers, like *Jasminum Auriculatum,* but yellow in colour and without odour. Planted in gardens. Not very common.

### PASSIFLORA L.

FAM.—Passifloraceæ.

COM. NS. :—*E.* Passion Flower; *M.* Krishna-kamal.

They are tendril bearing climbers with usually 3-lobed green leaves and require a trellis for their support. They bear showy flowers of different shades. Propagated by cuttings or layers. Mostly American.

The following species are grown in the gardens.

**PASSIFLORA EDULIS Sinns.**—With bluish purple fragrant flowers.

**PASSIFLORA FOETIDA Linn.**—With small white flowers; ornamental for its deuse foliage.

**PASSIFLORA HOLOSERICEA Linn.**—With mottled flowers.

**PASSIFLORA LAURIFOLIA Linn.**—With large blue fragrant flowers.

**PASSIFLORA RACEMOSA Brot.**—With deep-red or scarlet flowers.

**PASSIFLORA RADDIANA Dc.**—With bright red flowers with narrow petals.

### PERGULARIA MINOR Ands.

FAM.—Asclepiadaceæ.

COM. NS. :—*M.* Kunj-lata.

A large climber, a native of the Himalayas, with ovate, cordate leaves, and umbellete cymes of greenish-yellow, sweetly scented flowers. Largely grown in gardens.

### PETREA VOLUBILIS Linn.

FAM.—Verbenaceæ.

A large climber with rough ovate or lanceolate leaves, a native of Tropical America. The flowers are in copious racemes, remarkable for the large persistant purplish blue sepals remaining long after the violet petals have fallen off.

## PHILODENDRON Schott.

FAM.—Araceæ.

A genus of Tropical American plants, chiefly climbers, adhering to trees or walls by roots, and usually with handsome leaves having brilliant metallic lustre. Highly decorative. Propagated by layers and cuttings. Common in Tropical America.

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**Ornamental plants.**
**Climbers.**

**PHILODENDRON CARDERI Hort.**—Leaves dark-shaded bottle-green with satiny lustre; the main ribs green with metallic hue.

**PHILODENDRON NOBILE.**—Leaves obovate-lanceolate with leathery texture; the lower portion of the spathe deep rosy-crimson, the upper part white internally marked with deep rose spots.

## POTHOS AUREA Linden.

FAM.—Araceæ.

A showy plant, climbing by aerial roots. Leaves large thick, fleshy, ovate, strikingly variegated, dark green, boldly and irregularly marked by bands of or bloches of yellow (varying from cream to orange). A native of Tropical Asia.

## QUISQUALIS INDICA Linn.

FAM.—Combretaceæ.

COM. NS. :—*E.* Rangoon creeper; *M.* Lal-chameli, Rangoonchavel.

A strong climber. Leaves opposite, elliptic; flowers in pendulous spikes, with a long calyx tube, at first white then deep red. Flowers March-August. A native of Burma and Malaya; widely cultivated in India.

*See* Medicinal Plants.

## ROUPELLIA GRATA Wall.

FAM.—Apocynaceæ.

A stout tall climber, a native of West Africa. Leaves opposite, elliptic, shining; flowers, rather large, pale-rose, with a ring of processes rising from the thick corolla lobes, in large terminal cymes. Flowers during hot season. Propagated by cuttings.

## STEPHANOTIS FLORIBUNDA Brongn.

FAM.—Asclepiadeaceæ.

COM. NS. :—*E.* Madagascar Jasmine.

A handsome climbing shrub, with opposite, coriaceous, elliptic, smooth leaves and highly fragrant white flowers in umbelliform cymes. Propagated by cuttings. A native of Madagascar.

### STIGMATOPHYLLON PERIPLOCIFOLIUM.

FAM.—Malpighiaceæ.

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Ornamental plants.
Climbers.

An elegant climber, native of Tropical America, producing fine yellow flowers. Propagated by layers.

### TECOMARIA CAPENSIS Spach.

FAM.—Bignoniaceæ.

A climber with pinnate leaves and dense racemes of orange-red flowers 5 cm. long, with a long arcuate corolla tube. Propagated by cuttings. A native of South America.

### THUNBERGIA ALATA Boj.

FAM.—Acanthaceæ.

COM. NS. :—*E*. Black-eyed susan.

A small twiner. It has orange-yellow, pale-yellow or milk-white moderate-sized flowers; throat of the corolla purple, black or deep claret coloured with a dark-coloured eye at the base. Tropics.

### THUNBERGIA FRAGRANS Roxb.

FAM.—Acanthaceæ.

COM. NS. :—*M*. Chimine.

A twining perennial with slender stem. Leaves deltoid or lobed, base cordate, or rounded; flowers tubular, pure white, about 4 cm. long; Flowers Oct.-Nov. Wild in Konkan, Kanheri jungles, Panchagani. The flowers are not fragrant.

### THUNBERGIA GRANDIFLORA Roxb.

FAM.—Acanthaceæ.

A large climber, a native of E. Bengal. Leaves large cordate, ovate or angular; flowers bluish in racemes. Propagated by suckers.

### THUNBERGIA MYSORENSIA T. Anders.

An extensive climber with red and orange flowers is often found in gardens. A native of tropics.

### TRADESCANTIA ZEBRINA Hort.

FAM.—Commelinaceæ.

A pretty basket herb of creeping habit with striped leaves. The silver variety is specially elegant. Very ornamental when grown in moist shady places as fern-houses. Propagated by cuttings. Common in Tropical America.

## FERNS.

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—
Ornamental plants
Ferns.

Ferns are a very extensive class of flowerless plants, all more or less remarkable for grace and beauty of their foliage. In natural conditions they are invariably found growing in shady places, on old walls, overhanging a running brook or water-falls. Nearly all ferns – for growing in gardens – can be multiplied by division of roots or by spores.

The following ferns are generally cultivated in gardens.

### ACTINIOPTERIS DICHOTOMA Bedd.

FAM.—Polypodiaceæ.

Stipes densely tufted. Fronds like the leaves of a miniature palm.

### ADIANTUM L.

FAM.—Polypodiaceæ.

COM. NS. :—*E.* Maiden – Hair Ferns.

Cosmopolitan. 190 species. Numerous species cultivated in gardens. The following are generally grown in Bombay State.

### ADIANTUM CAPILLUS VENERIS L.

FAM.—Polypodiaceæ.

Stipe scaly, purplish-black, polished. Fronds 2-3 pinnate; ultimate pinnules fan shaped.

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### ADIANTUM CAUDATUM L.

FAM.—Polypodiaceæ.

Stipes and rachis brown, polished hairy. Fronds pinnate, often rooting at the tips.

### ADIANTUM COLLISII Moore.

FAM.—Polypodiaceæ.

Stipe and rachis black, polished, naked. Frond at least four pinnate.

### ADIANTUM CONCINNUM H. B. K.

FAM.—Polypodiaceæ.

Stipe short, black, polished, naked. Frond ovate, triangular, 3-4 pinnate.

### ADIANTUM CUNEATUM Langs. & Fisch.

FAM.—Polypodiaceæ.

Stipe slender, black, naked, polished. Frond triangular, 3-4 pinnate.

### ADIANTUM FORMOSUM R. Br.

FAM.—Polypodiaceæ.

Stipe black, glossy, very long. Fronds long, 3-4 pinnate.

### ADIANTUM GRACILLIMUM Moore.

FAM.—Polypodiaceæ.

Frond triangular, at least four pinnate. A very pretty fern.

### ADIANTUM LUNULATUM Burm.

FAM.—Polypodiaceæ.

Stipes black to brown, wiry, polished. Fronds pinnate, often rooting at the tips.

### ADIANTUM MICROPHYLLUM Sw.

FAM.—Polypodiaceæ.

Stipe black, polished, naked. Fronds long pinnate.

### ADIANTUM PERUVIANUM Klotzch.

FAM.—Polypodiaceæ.

Stipe strong, erect, black, polished, naked. Fronds simply pinnate or lower branches again pinnate or bipinnate.

### ADIANTUM TENERUM Sw.

FAM.—Polypodiaceæ.

Stipe about 30 cm. long, black, polished, naked except at the very base which is scaly. Fronds 30-90 cm. long, triangular, 3-4 pinnate.

### ALOSPHILA LATEBROSA Hook.

FAM.—Cyntheaceæ.

Stipes armed with short or sharp elevated points. Fronds bipinnate.

### ANEIMA ROTUNDIFOLIA Schrad.

FAM.—Schizeaceæ.

Stipe hairy, frond with fertile and barren portions. Portions pinnate, fertile portion panicled.

### ANGIOPTERIS EVECTA Hoftmann.

FAM.—Marattiaceæ.

A handsome gigantic fronded fern. Fronds 2-7 m. long Bipinnate rachis swollen at the base.

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Ferns.

### ASPIDIUM Sw.

FAM.—Polypodiaceæ.

The following species are grown in gardens in Bombay State.

### ASPIDIUM CICUTARIUM Sw.

Stipes scaly, close to the base. Fronds variable in size and cutting, triangular in outline.

### ASPIDIUM MACROPHYLLUM Sw.

Stipes tufted, scaly below. Fronds 60-90 cm. long, pinnate, terminal pinnae 3-lobed or segmented.

### ASPIDIUM TRIFOLIATUM Bedd.

Stipes tufted, scaly. Fronds pinnate. 30-45 cm. long.

### ASPLENIUM L.

FAM.—Polypodiaceæ.

A large genus of cosmopolitan ferns. The following spines are commonly grown in gardens.

### ASPLENIUM BELANGERI Kze.

Stipe erect, greenish, fronds with segments close.

### ASPLENIUM DIMORPHUM Kze.

Stipe 15-30 cm. long, naked, fronds about a meter long, ovate-triangular, of two kinds, fertile and sterile.

### ASPLENIUM VIVIPARUM Presl.

Stipe firm, erect, greenish, covered with hair, pointed scales. Fronds not dimorphous, segments distant.

### BLECHNUM L.

FAM.—Polypodiaceæ.

A cosmopolitan genus of ferns with 220 species. The following species are commonly grown.

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### BLECHNUM CARTILAGINEUM Sw.

Stipe scaly, covered with short, hard, tubercular excrescences. Fronds pinnate, broadly lance-shaped.

### BLECHNUM OCCIDENTALE L.

Stipes erect, scaly. Fronds pinnate, lance-shaped, acuminate.

### BLECHNUM ORIENTALE L.

Stipes scaly below. Fronds long, lance-shaped, ovate in outline, pinnate.

### CHEILANTHES FARINOSA Kaulf.

FAM.—Polypodiaceæ.

Stipes reddish brown to black polished, naked or scaly near the base. Fronds triangular in outline, bi-pinnatifid.

### CYRTOMIUM FALCATUM Presl.

FAM.—Polypodiaceæ.

Stipes tufted, densely clothed with huge brown scales. Frond long lanceolate, pinnate. A native of Eastern Asia.

### DAVALLIA BULLATA Wall.

FAM.—Polypodiaceæ.

Rhizome creeping. Frond triangular, four-pinnatifid with deeply incised segments. Tropical.

### DAVALLIA FIJIENSIS H. K.

FAM.—Polypodiaceæ.

Rhizome thick, creeping. Frond triangular, four-pinnatifid; segments cut into narrow linear divisions. Tropical.

### DIPLAZIUM SYLVATICUM.

FAM.—Polypodiaceæ.

Stipe scaly. Frond ovate-lanceolate and simply pinnate; pinnae about 15 cm. long. Tropical.

### DRYNARIA QUERCIFOLIA Bory.

FAM.—Polypodiaceæ.

Rhizome short, thick, fleshy, densely covered with red-brown hairs. Fronds of two kinds, sterile smaller, variously lobed; fertile long-stalked. Tropical.

## GYMNOGRAMMA CALOMELANOS Kaulf.

FAM.—Polypodiaceæ.

Stipes tufted, scaly below and together with rachis, black, polished. Fronds oblong, triangular, tri-pinnatifid. Tropical.

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**Ornamental plants**

**Ferns.**

## GYMNOPTERIS FLAGELLIFERA.

FAM.—Polypodiaceæ.

Stipes often scaly. Fronds simple 3-foliate or pinnate, with 5-11 pinnae, the terminal pinna often much prolonged. Warm tropics of both hemispheres.

## GYMNOPTERIS QUERCIFOLIA Bernh.

FAM.—Polypodiaceæ.

Stipes of the fertile fronds longer than those of the sterile. Sterile fronds nearly prostrate, more or less Oak-leaf shaped.

## HEMIONITES ARIFOLIA Bedd.

FAM.—Polypodiaceæ.

Stipes dark-brown, polished, hairy, those of the fertile frond longer than those of the barren. Fronds, barren heart-shaped, ovate with a deep notch at the base, fertile halbert-shaped. Common in Tropical Asia.

## LASTREA TENERICAULIS Bedd.

FAM.—Polypodiaceæ.

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Stipes tufted, slightly scaly below, covered with bluish bloom. Fronds broad ovate-lanceolate, bipinnate.

## LASTREA THELYPTERIS Presl.

FAM.—Polypodiaceæ.

Stipes distant. Fronds pinnate.

## LITOBROCHIA TRIPARTITA J. Sm.

FAM.—Polypodiaceæ.

Stipe erect, straw-coloured, naked, polished. Fronds divided into 3 parts. Central longest, having terminal pinna 15-22 cm. long; lateral divisions smaller than the central and similar to it.

## LYGODIUM JAPONICUM Sw.

FAM.—Schizeaceæ.

Fronds scandent, consisting of a twining rachis, pinnae arising in pairs from the ends of spurs on the twining rachis. Tropical.

### NEPHRODIUM MOLLE Desv.

FAM.—Polypodiaceæ.

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Stipes hairy, scaly or naked. Fronds pinnate.

### NEPHROLEPIS ACUTA Presl.

FAM.—Polypodiaceæ.

Rhizome erect. Stipes tufted, naked or scaly. Fronds upto 3 m. drooping, pinnae large.

### NEPHROLEPIS COROLIFOLIA Baker.

FAM.—Polypodiaceæ.

Stipes tufted, wiry, scaly. Fronds small, pinnate.

### NEPHROLEPIS EXALTATA Schott.

FAM.—Polypodiaceæ.

Rhizone almost erect. Stipes tufted scaly. Fronds 30-90 cm. pinnate.

### OSMUNDA REGALIS L.

FAM.—Osonundaceæ.

Stipes tufted 30-45 cm., fronds more than a meter, bi to tri-pinnate.

### PLEOPELTIS PHYMATODES Bedd.

FAM.—Polypodiaceæ.

Rhizome wide-creeping. Stipe firm, erect, smooth. Fronds varying, simple oblong-lanceolate to deeply pinnatifid lobes.

### PLEOPELTIS PUNCTATA Bedd.

FAM.—Polypodiaceæ.

Stipe short, often absent. Fronds simple, entire, lanceolate.

### PTERIS CRETICA L.

FAM.—Polypodiaceæ.

Stipe erect, naked, straw-coloured. Frond pinnate; pinnae linear, lance-shaped.

### PTERIS ENSIFORMIS Burm.
### *Var.* VICTORIAE.

FAM.—Polypodiaceæ.

Stipe naked. Fronds of two sort; fertile fronds with lateral pinnae forked or trifid, sterile smaller more compound with the pinnules.

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Ferns.

## PTERIS LONGIFOLIA L.

FAM.—Polypodiaceæ.

Stipes scaly, fronds broadly lance-shaped in outline, often narrowed below.

## PTERIS LUDENS Wall.

FAM.—Polypodiaceæ.

Stipe black, polished, slightly scaly, often hairy. Fronds of two kinds, barren ones triangular; fertile deeply lobed and roughly palmate.

## PTERIS QUADRIAURITA Retz.

FAM.—Polypodiaceæ.

Stipes naked or rough. Fronds lanceolate or ovate, pinnate pinnae linear.

## PTERIS WALLICHIANA Ag.

FAM.—Polypodiaceæ.

Stipes about 2 m. long, strong, bright, chestnut brown, naked, glossy, fronds divided into 3 parts pinnate.

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## ORCHIDS.

FAM.—Orchidaceæ.

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—
Ornamental plants
Orchids.

This is a family of plants having much varied form, and growth with flowers of many colours. They are most numerous in the tropics, but a large number are found in the temperate region as well. They are found in moist and humid situations often growing out of the crevices of rocks, upon moss-grown situations, and upon branches and trunks of trees. Orchids are terrestrial and epiphytic and saprophytic. Terrestrial orchids are those which grow more or less in soil and take their nourishment by the roots embedded in it. Epiphytic orchids grow upon the branches of trees, having their roots exposed to the air, from which they take all the nourishment required for their growth. Saprophytic orchids are few. They have no green leaves. They are not cultivated. Propagated by division of roots of pseudo-bulbs. Now-a-days they are also grown from seeds, which requires pure culture methods in which mycorrhiya is present.

### ACAMPE WIGHTIANA Lindl.

An epiphytic herb, leaves thick, flat, irregularly 2-lobed at the apex. Flowers in panicles; perianth yellow barred with red; lip white with red stripes. Flowering – May; Konkan and S. M. Country.

### AERIDES CRISPUM Lindl.

An epiphytic herb with leafy stem. Flowers in long branched racemes, pinkish-white, shaded with darker pink; lip marked with pink lines. Flowering April-May. Very common in Konkan, Deccan and Mahabaleshwar.

### AERIDES RADICOSUM A. Rich.

An epiphytic herb with leafy stem. Flowers deep rose coloured, in stout racemes; Flowering May. Common in Konkan, Deccan, Mahabaleshwar and Kanara.

### CIRRHOPETALUM FIMBRIATUM Lindl.

An epiphytic herb. Leaves oblong-lanceolate. Flowers in umbels; perianth fringed with purple cilia, lip reddish-brown. Flowering April-May. Common in Konkan, Deccan, Mahabaleshwar, S. M. Country. This is known as the "UMBRELLA ORCHID".

### CYMBIDIUM ABOIFOLIRUM Swarfy

An epiphytic herb with short stem. Leaves fleshy long, linear-oblong, notched at the apex. Flowers in many flowered drooping racemes. Perianth yellowish red. Lip purplish. Flowering April-May. Common in Konkan, Ghats and N. Kanara.

### DENDROBIUM ALBO-SANGUINEUM Lindl.

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An epiphytic herb with thick stem; Leaves linear lanceolate. Flowers large, pale-buff with maroon-purple blotches at the base of the lip with broad claw. Flowering during hot season; a native of Burma.

### DENDROBIUM AGGREGATUM Roxb.

An epiphyte. Pseudobulbs clustered, 1-leaved; Flowers in arching racemes, primrose- yellow when first expanded, changing in age to orange-yellow with a deeper colour on the lip which is transversely oblong. Flowering in the hot season; a native of Assam and Burma.

### DENDROBIUM AQUEUM Lindl.

An epiphyte with long decumbent stout stem. Leaves ovate-oblong. Flowers solitary or in pairs, cream-white except a yellowish disk on the 3-lobed lip. Flowering at the end of the rainy season. A native of the Nilgiris.

### DENDROBIUM BARBATUM Lindl.

An epiphyte with long stem with swollen base and tapering apex. Leaves small, lanceolate. Flowers in racemes, white, often suffused with pink, glistening when fresh; lip 3-lobed with yellow hairs at the base. Flowering April-May. Common in Konkan, Matheran and Mahabaleshwar.

### DENDROBIUM CHLOROPS Lindl.

An epiphyte with tufted stem. Flowers, small, in racemes with primrose-like scent; lip 3-lobed, middle lobe cream-coloured side lobes greenish. Flowers in the cold season. Throughout the Konkan, Ghats and Mahabaleshwar.

### DENDROBIUM CREPIDATUM Lindl.

An epiphyte with thick, tufted stem. Leaves linear-lanceolate. Flowers in fascicles, of wax-like texture, white tinted with lilac except the disk which is yellow; lip with yellow disk and white tip. Flowering March-April. Common in Konkan, Mahabaleshwar, S. M. Country, Kanara.

### DENDROBIUM CRETACEUM Lindl.

An epiphyte with long stout stem. Leaves small, oblong-lanceolate. Flowers, small, solitary, cream-white; lip fimbriate, disk yellowish with crimson streaks. Flowering in hot season. A native of Assam and the Khasia hills.

## DENDROBIUM DALHOUSIEANUM Wall.

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An epiphyte with very long stem, spotted with purple when young; leaves ovate-lanceolate. Flowers very large in drooping racemes, pale-yellow, veined and tinted with rose; lip 3-lobed with a large maroon-purple blotch on each side near the base. Flowering during hot season. A native of Sikkim, Assam and Burma.

## DENDROBIUM FARMERI Paxt.

An epiphyte with long four angled stem. Leaves elliptic-oblong, dark green near the top of the stem. Flowers, rather large, pale straw-yellow tinted with rose; lip with deep-yellow disk. A native of the Eastern Himalayas, Assam and Burma.

## DENDROBIUM FORMOSUM Roxb.

An epiphyte with thick, long stem; leaves ovate-oblong, 2-lobed at the apex. Flowers in spikes, very large, white with an orange blotch on the lip which is nearly 10 cm. in diam. Flowering in hot season. A native of Tropical Himalayas, Assam, Khasia Hills and Burma.

## DENDROBIUM HETEROCARPUM Wall.

An epiphyte, with erect, stout, long stem. Leaves oblong-lanceolate. Flowers medium sized with primrose fragrance, cream-coloured; lip buff-yellow with reddish-purple streaks. Flowering in February. A native of Nepal, Assam and Burma.

## DENDROBIUM MACRAEI Lindl.

COM. NS. :—*M*. Joivansi.

An epiphyte with creeping rhizome and polished long stem. Leaf solitary terminal, large, linear-oblong. Flowers small, white, 1-3 near the base of the leaf, lip yellow, flowering in June-August; common in Mahabaleshwar, S. M Country, Kanara.

## DENDROBIUM MACROSTACHYUM Lindl.

An epiphyte; stems many, crowded, leaf bearing stems short, flower bearing very long. Leaves oblong-lanceolate. Flowers small, pale-green or yellow, fragrant; lip yellow at the tip, disk veined with purple. Flowering May. Common in Konkan, Deccan, Koyna valley, S. M. Country and Kanara.

## DENDROBIUM NOBILE Lindl.

An epiphyte, with tufted stems. Leaves ovate-lanceolate. Flowers rather large, fragrant, white tipped with rosy-pink; lip white, rosy-pink in front, blotched at the base with deep velvety-crimson. A native of the Eastern Himalayas, Khasia Hills and China.

### DENDROBIUM PARISHII Reichb.

An epiphyte with thick stem; leaves oblong-lanceolate. Flowers rose-purple; lip woolly rosy with two eye-like purple blotches in the centre. A native of upper Burma.

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**Orchids.**

### DENDROBIUM PIERARDI Roxb.

An epiphyte with long, slender stems. Leaves ovate-lanceolate. Flowers medium sized, usually in pairs, pale rosy-mauve; lip primrose-yellow, with purple streaks at the base. Thrives beautifully in conservatories. A native of Sikkim and Bengal.

### ERIA RETICOSA Wight.

A stemless epiphyte, leaves 2, oblong or elliptic-lanceolate. Flowers solitary, large for the size of the plant, white; lip 3-lobed, side lobes white edged with a purple line, mid-lobe with yellow base and white tip. Flowering July. Very common in Konkan, Western Ghats, Mahabaleshwar and Lonavala.

### EULOPHIA NUDA Lindl.

COM. NS. :–*M.* Amarkanda.

A terrestrial herb with fleshy tubers. Leaves long, from the sides of the tubers, elliptic-lanceolate. Flowers 9-20 in lax racemes, with sepals greenish-purple and white petals; lip white or yellow flushed with pink or purple. Flowering June. Common in Konkan, S. M. Country and Kanara.

### EULOPHIA PRATENSIS Lindl.

COM. NS. :–*M.* Satavari.

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A terrestrial orchid; leaves, long petiolate, oblong-lanceolate, appearing after the flowers; flowers yellow in lax racemes. Scape ·3-1·0 m. long; lip 3-lobed; disk with 3 crested nerves. Flowering Nov.-Feb. Common in Deccan, pasture lands near Poona, Panchgani and S. M. Country.

### HABENARIA GRANDIFLORA Lindl.

A terrestrial small plant. Leaf solitary, radial, suborbicular. Flowers white in 1-4 flowered lax racemes; lip three partite. Flowering July. Common in Konkan, Deccan–Mawal, Mahabaleshwar, Sinhagad.

The tubers furnish the *Salep misri* of Indian bazars.

### HABENARIA PLATYPHYLLA Spreng.

A terrestrial small plant, leaves 3-6, fleshy, rather large, lying flat on the ground. Flowers small white, fragrant, in dense-flowered spikes. Spur long with funnel-shaped mouth; lip veined. Flowering August-September. Common in Konkan, S. M. Country.

### PHALAENOPSIS AMABILIS Lindl.

COM. NS. :—*E.* Queen of the Orchids, Indian Butter-fly Plant.

A lovely epiphytic orchid, a native of Malaya, with a short stem. Leaves few, broad, thick, leathery. Flowers showy in racemes, very large. Milk-white; lip marked with purple lines; resembling a butterfly with expanded wings. Flowering Feb.-Apr.

### PHALAENOPSIS GRANDIFLORA Lindl.

Very similar to *Phalaenopsis Amabilis,* but lip stained yellow.

### PLATANTHERA SUSANNAE Lindl.

COM. NS. :—*M.* Wagehora.

A tall stout terrestrial herb. Leaves ovate-oblong. Flowers in 3-6 flowered racemes, white, fragrant; spur very long about 10 cm. Flowering Sept. Common in Konkan, Matheran, Deccan, Mahabaleshwar and Khandala.

### RHYNCHSTYLIS RETUSA Blume.

An epiphytic herb, with thick stem. Leaves linear, long, 2-lobed at the apex. Flowers handsome, in dense racemes, pale-pink dotted with deeper colour spots; lip deeper pink. Flowering May. Common in Konkan and Kanara.

### THUNIA VENOSA Rolf.

An epiphytic herb. Leaves sheathing the stem; gradually larger upwards, Flowers 3-4 terminal racemes, pure white, sepals and petals erect in flowering and spreading like a fan; lip with midlobe fringed. Flowering July-Aug. Common in Konkan, Matheran, Deccan, Khandala and Mahabaleshwar.

### VANDA PARVIFLORA Lindl.

An epiphyte with leafly stem; leaves linear oblong, keeled, 2-lobed at the apex. Flowers small in racemes, yellow; lip with mid-lobe fleshy, disk whitish with 2-lilac coloured ridges. Flowering May. Common in Konkan, Deccan, Mawal, Mahabaleshwar hills and S. M. Country.

### VANDA ROXBURGHII R. Br.

An epiphytic herb with long stem. Leaves thick, linear, keeled, with 2 unequal lobes at the apex. Flowers in 6-10 flowered long racemes; petals and sepals yellow with brown lines and white margins; lip bluish dotted with purple. Flowering July. Common in Konkan, Gujarat and Kanara.

## SHRUBS.

### ABELMOSCHUS MOSCHATUS Medik.

FAM.—Malvaceæ.

COM. NS. :—*E.* Mush-mallow ; *M.* Kasturi-bhendi.

A tall hairy annual shrub, bearing large showy flowers, yellow with purple centre ; flowering in cold season. Tropical.

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*See* Medicinal Plants, Fibres.

### ABUTILON STRIATUM Dick.

FAM.—Malvaceæ.

A slender erect branching shrub ; leaves 3 or 5 lobed ; flowers axillary, large, rosy with white streaks. Propagated generally by cuttings. Tropical.

### ACALYPHA HISPIDA Burn.

FAM.—Euphorbiaceæ.

A shrub, native of New Guinea. It has broadly ovate, cordate leaves and very long pendulous spikes of minute crimson flowers which appear in October ; propagated by cuttings.

### ACALYPHA WILKESIANE Muell.

FAM.—Euphorbiaceæ.

A tall shrub, native of Fiji Islands, often grown in gardens for the sake of its highly ornamental leaves, which are large, naturally bronze coloured, but a great variety of tints pink, yellow and brown are found under cultivation. Numerous varieties are cultivated, specially adapted for growth under heavy rainfall conditions. Propogated by cuttings.

### APHELANDRA CRISTATA R. Br.

FAM.—Acanthaceæ.

A small shrub, native of W. Indies. It has lanceolate leaves with numerous large orange-scarlet flowers in terminal branching spikes.

### ARGYREIA CUNEATA Ker-Gawl.

FAM.—Convolvulaceæ.

COM. NS. :—*M.* Mahalungi.

A shrub, usually erect but with a tendency to climb when near support ; flowers, rather large, tubular, bright-purple ; flowering from July to September. Tolerably common in the dry districts in the State. Cultivated in gardens for its showy flowers. Native of Tropical Area,

### ARTABOTRYS ODORATISSIMUS R. Br.

Fam.—Anonaceæ.

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COM. NS. :—*M.* Hirva-Chapha.

A large shrub of scandent habit, with dense foliage of handsome glossy, pure green leaves; bears in rains thick fleshy flowers, green until ripe, when they become yellowish; they have an agreeable smell. Propagated by seeds and cuttings during the rains. Tropics.

### ARTOCARPUS CANNONI Hort. Bull.

Fam.—Moraceæ.

A shrub about 2 m. high; leaves alternate, glossy, rich bronzy crimson, tinted with purple and varying in form from heart-shaped to deeply three-lobed. It requires rich soil with full exposure to the Sun. Propagated with difficulty from cuttings. Indo-Malayan.

### ARUNDO DONAX Linn.

Fam.—Gramineæ.

COM. NS. :—*M.* Devanal.

A tall grass, 2-3 meters high with flowers in large erect decompound panicles, often grown as an ornamental grass in clumps on lawns in gardens. A variegated variety is also grown. Common in tropical and temperate zones.

*See* Fibres.

### ASCLEPIAS CURASSAVICA Linn.

Fam.—Asclepiadaceæ.

COM. NS. :—*M.* Kakatundi.

An erect undershrub with thin lanceolate leaves and orange coloured flowers in umbels; wild in shady places; often grown as an ornamental plant in gardens; blossoms in cold season. Propagated by seeds. Native of West Indies.

*See* Medicinal Plants, Fibres.

### ASTER AMELLUS Linn.

Fam.—Compositæ.

COM. NS. :—*E.* The Michælmas Daisy.

A dwarf perennial herb; Leaves radial, lanceolate of greyish-purple shade; bears very numerous heads of purple flowers in the cold season. They are good rockery plants. Propagated by division of roots.

## ASYSTASIA COROMANDELIANA Nees.

FAM.—Acanthaceæ.

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An erect or procumbent undershrub, bears pretty flowers, in long spike-like racemes, pale-blue with a yellowish tube and usually a purple bract on the lowest lobe; wild in Konkan, W. Ghats and Deccan; often cultivated in gardens.

*See* Famine Plants.

## BARLERIA CRISTATA Linn.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Gokarn.

A herbaceous hairy undershrub; flowers funnel shaped, blue in axillary and terminal dense spikes; wild in Konkan and Deccan. Planted in gardens *var. dichotoma Prain,* with white flowers. Often planted near temples. Flowers in Dec. Propagated by seeds. Tropical.

## BARLERIA GIBSONI Dalz.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Gura.

A shrubby plant with fine pink, long, funnel-shaped flowers; solitary, axillary and in terminal spikes-makes and showy conseneatory plant. Flowers Sept.-November. Propagated by seeds. Tropical.

## BARLERIA GRANDIFLORA Dalz.

FAM.—Acanthaceæ.

A shrubby plant with long, white, funnel-shaped flowers, axillary and solitary; Konkan and Kanara. Flowering in November. Propagated by seeds. Tropical.

## BARLERIA PRIONITIS Linn.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Pivali Koranti.

A much branched prickly shrub; flowers yellow or orange, two-lipped, solitary. Common throughout the state; often planted as hedge, propagated by seeds. Tropical.

*See* Medicinal Plants.

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### BAUHINIA ACUMINATA Linn.

FAM.—Caesalpiniaceæ.

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COM. NS. :—*M.* Kanchan.

An erect shrub about 2·5 m. high, bearing pure white fragrant flowers, which appear about June-July; cultivated in gardens. Propagated by seeds. Tropical.

### BAUHINIA TOMENTOSA Linn.

FAM.—Caesalpiniaceæ.

An erect very ornamental shrub with flowers usually in pairs; petals yellow, the upper petal with a purple blotch on the face; in bloom from November-January. Propagated by seeds; Cultivated in gardens. Tropical.

*See* Medicinal Plants.

### BRYOPHYLLUM PINNATUM Kurz.

### (BRYOPHYLLUM CALYCINUM Salisb.).

FAM.—Crassulaceæ.

A succulent glabrous tall herb. Very ornamental when in blossom in February, with its numerous, large, globular formed flowers of pale-green tinged with red, drooping prellily like bells. Propagated by succulent leaves which throw out roots, in contact with moist soil. Tropical cosmopolitan.

### CAESALPINIA PULCHERRIMA Swartz.

FAM.—Caesalpiniaceæ.

COM. NS. :—*E.* Peacock Flower; *M.* Sankasur.

A large more or less prickly shrub with bipinnate foliage; bears all the hot and rainy seasons, panicles of large showy flowers with very long filaments. There are two varieties (1) Yellow-Flowered (2) Scarlet-Flowered. Propagated by seeds. Tropical.

### CARALLUMA FIMBRIATA Wall.

FAM.—Asclepiadaceæ.

COM. NS. :—M. Makadshing (Monkey's horn.).

An erect fleshy perennial herb; branches 4 angled. Leaves minute, present on young shoots. Flowers terminal 2-3 together, purple; petals copiously fimbriate with long purple flattened hairs; flowers in June; wild in hills near Poona. Worth growing on the rockeries in the gardens.

### CARISSA ARDUINA Lam.

FAM.—Apocynaceæ.

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A dwarf glabrous shrub, with twice forked spines. Flowers with white petals and pale-pink sepals. Fruit, a scarlet coloured berry. Pretty when in flowers and fruits. A native of S. Africa.

### CARLUDOVICA PALMATA Ruizet. et Pav.

FAM.—Cyclanthaceæ.

COM. NS. :—Panama hat plant.

A stemless bush with large palm-like, leaves similar to those of fan-palm, with long cylindric stalks. The flowers are produced in cones. A native of Tropical America. Largely cultivated as ornamental plant.

*See* Fibres.

### CASSIA BICAPSULARIS Linn.

FAM.—Caesalpiniaceæ.

A shrub with 3-4 pairs of leaflets; flowers bright yellow and sausage- shaped pods. A native of Tropical America. Often grown in gardens.

### CASSIA TOMENTOSA Linn.

FAM.—Caesalpiniaceæ.

A tall shrub, with 6-8 pairs of leaflets, bright yellow flowers in carymbose panicles and finely downy pods 10-12 cm. long. A native of Tropical America. Frequently planted in gardens; in bloom from January-March. Propagated by seeds.

### CATESBAEA SPINOSA Linn.

FAM.—Rubiaceæ.

A thorny shrub of moderate size with myrtte sized leaves and trumpet shaped whitish flowers; curious for the strange way in which the flowers hang from it without seeming to belong to it; in blossom at intervals during the hot and rainy seasons. Propagated by cuttings. Native of West Indies,

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### CITHAREXYLUM SUBSERRATUM Sw.

FAM.—Verbenaceæ.

COM. NS. :—*E.* Fiddle-wood Tree; *M.* Sitaranjan.

A large shrub or a small tree, a native of the W. Indies; bears elliptic, obovate, axillary drooping racemes of numerous small, milk-white, very fragrant flowers. Propagated by cuttings.

### CLERODENDRON ACULEATUM Griseb.

FAM.—Verbenaceæ.

An armed shrub, 1·5-3 m. high, a native of W. Indies; it has elliptic lanceolate leaves and small fragrant white flowers with long exerted purple stamens. Flowering in October. Very suitable for fence or toparian work. Propagated by cuttings or offsets.

### CLERODENDRON CALAMITOSUM Linn.

FAM.—Verbenaceæ.

A shrub, a native of Malaya and Java. It has rather large elliptic leaves and panicles of white tubular flowers. Flowering Sept.-Oct.

### CLERODENDRON FALLAX Lindl.

### (CLERODENDRON BUCHANANII.)

FAM.—Verbenaceæ.

A small shrub about 1 m. high; produces in March briliant scarlet flowers in large semi-spherical heads. Propagated by cuttings.

### CLERODENDRON FRAGRANS R. Br.

FAM.—Verbenaceæ.

A vigorous, low-growing, shrub with large leaves, a native of China; bears flowers, white tinged with pink, of delicate fragrant; in compact heads; Propagated by suckers.

### CLERODENDRON INERME Gaertn.

FAM.—Verbenaceæ.

COM. NS. :—*M.* Vanajai, Koyand.

A straggling much-branched shrub with opposite dark green elliptic leaves. Flowers, white, with long tube, and very long exerted filaments, borne on axillary cymes. 3-9 flowered (commonly 3). Flowering in Nov.-Jan. Common along the sea-coast in Konkan and Thana district. Makes a good hedge. Animals do not touch this plant on account of the disagreeable taste of the leaves. Propagated by seeds or cuttings.

## CLERODENDEON INFORTUNATUM Linn.

FAM.—Verbenaceæ.

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COM. NS. :—*M.* Bhandira.

A shrub, 1-2·5 m. high, branches yellowish silky hairy ; leaves large ; pinkish white, in stalked cymes forming large panicles. A common roadside weed in Konkan and S. M. Country, worth growing in gardens, as it is very pretty when in bloom from Oct.-January.

## CLERODENDRON NUTANS Wall.

FAM.—Verbenaceæ.

A tall shrub, a native of Madagascar ; flowers large, white, tubular in long drooping panicles. Presenting a most lovely appearance when in bloom, September onwards. Propagated by cuttings.

## CLERODENDRON PHLOMIDIS Linn.

FAM.—Verbenaceæ.

COM. NS. :—*M.* Iran.

A large bush, producing numerous small pinkish white fragrant flowers. Flowering August-February. Common in hedges throughout the State. Propagated by cuttings.

*See* Timbers.

## CLERODENDRON SIPHONANTHUS R. Br.

FAM.—Verbenaceæ.

A shrub about 2·5 m. high with narrow oleander-like **leaves,** a native of Assam and Sikkim ; flowers white in large terminal panicles. Flowering in Sept.-Oct.

## CLERODENDRON SQUAMATUM Vahl.

FAM.—Verbenaceæ.

About 2·5 m. high, a native of China and Sumatra, Lcaves broadly ovate, cordate, flowers tubular, scarlet, in large panicles, resembling a mass of blight crimson coral. Flowering in April-May.

## CODIAEUM (Rumph. ex A. puss.)

FAM.—Euphorbiaceæ.

A genus of handsome, ornamental leaved plants, native chiefly of the Moluccas, but perfectly naturalised in this country. They are the hardiest of the decorative plants. Gardeners call these crotons. Propagated by cuttings. There are several varieties of crotons grown in the gardens.

### COFFEA ARABICA Linn.

FAM.—Rubiaceæ.

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COM. NS. :—*M*. Bund.

A large shrub; elegant with its dark-green glossy leaves; pure white abundant flowers and its load of red berries. Propagated by seed. Arabian.

*See* Fruit Trees.

### COLEUS Lour.

FAM.—Labiatæ.

A genus of plants from the tropics; remarkable for the exceeding beauty of their leaves, which are much the same in out-line, but varied in being fringed, saw-edged and fimbriated; while the variation and blending of colours is beyond description. For decorative purposes — especially for growing in borders or groups they are unequalled. The plants do not tolerate direct sunlight. Propagated by cuttings and seeds.

### COLEUS AMBOINICUS Lour.

FAM.—Labiatæ.

COM. NS. :—*E*. Indian Borage; *M*. Panacha-ova.

A small plant with succulent aromatic thick green leaves and pale-purple flowers; Grown in gardens.

*See* Condiments and Spices.

### COLEUS BARBATUS Benth.

FAM.—Labiatæ.

COM. NS. :—*M*. Main-mul.

A perennial plant, 30-60 cm. high, with thick fleshy root-stock; stem hairy. Leaves elliptic oblong hairy; flowers large, showy, pale-purple or blue, in whorls. Wild in Konkan, Deccan, Mawal. Cultivated in gardens for its fleshy roots which are pickled and eaten.

### COLEUS BLUMEI Lab.

FAM.—Labiatæ.

A small plant, a native of Java, grown in gardens for decoration. Varieties of coleus are grown for decorations. A very fine variety with valvety crimson leaves in *C. verschaffeltii.*

## CRASSANDRA UNDULAEFOLIA Salisb.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Aboli.

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An undershrub; leaves laceolate, 4 in whorl; bears orange-yellow flowers upon wheat-ear like heads. Flowering June-Jany. Propagated by seeds and cuttings.

## CYPERUS ALTERNIFOLIUS Linn.

FAM.—Cyperaceæ.

An elegant dark-green sedge, a native of Australia; suited for ferneries and plant houses, where it offers a pleasant contrast to the green foliage of lighter tints. It is also a good rocky plant.

## DAEDALACANTHUS NERVOSUS T. Anders.

FAM.—Acanthaceæ.

A small shrub, a native of N. Bengal. It has white, concave, ovate bracts with green veins and blue flowers in spikes, forming terminal panicles. Commonly planted in gardens.

## DADALCANTHUS PURPURASCENS T. Anders.

FAM.—Acanthaceæ.

COM. NS. :—*M.* Gulshan.

A plant very similar to the above, common on the Ghats, is worth growing in the gardens. Flowers from November-January. Indo-Malayan.

## DATURA ARBOREA Linn.

FAM.—Solanaceæ.

COM. NS. :—*M.* Dhotara.

A large shrub with very large trumpet-shaped pure white flowers. A native of Peru; abundant in Mahableshwar. Propagated by seeds.

## DATURA FASTUOSA Linn.

FAM.—Solanaceæ.

COM. NS. :—*E.* Black-datura; *M.* Kala-dhotara,

An annual shrub; flowers purple outside, white inside, double, large, funnel-shaped. Flowering, Sept.-Dec. Very common on rubbish heaps and waste-places. Propagated by seeds.

*Var. alba C. B. Clarke* has single rather smaller, white flowers. *See* Medicinal Plants, Poisonous Plants and Fish Poisons.

### DIEFFENBACHIA SEGUINE Scott.

FAM.—Araceæ.

COM. NS. :—E. Dumb-cane.

A plant of Tropical America, has erect stems bearing at the top, large partly-coloured leaves gracefully disposed on short stalks. Propagated by creeping stems.

### DODONAEA VISCOSA Linn.

FAM.—Sapindaceæ.

COM. NS. :—*M.* Jakhmi.

A stiff wiry evergreen shrub, with alternate smooth, shining leaves; flowers small, greenish-yellow in short axillary cymes; wild throughout the State in dry open situations. Commonly used for hedges in gardens. Propagated by seeds. Tropical.

### DRACAENA ELLIPTICA Thunb.

FAM.—Liliaceæ.

An under-shrub, a native of the Khasia hills and Burma, about 1 meter high, stem terete as thick as a goose-quill; leaves green or blotched with white or black, or all purple; flowers greenish-yellow.

There is a pretty variety *maculata* with the leaves blotched with yellow. Propagated by division or cuttings. Tropics of the old world.

### DRACAENA CONCINNA Kunth;

FAM.—Liliaceæ.

A neat growing shrub, reaching 2 m. high; with narrow green leaves with purplish red margins. A native of Mauritius. Propagated by division or cuttings.

### DRACAENA GOLDIEANA Bull.

FAM.—Liliaceæ.

A magnificient ornamental foliage plant, a native of Tropical Africa. Leaves ovate-cordate, marbled and irregularly banded with dark-green and silvery-grey bands. Flowers white in dense globose heads. Propagated by division or cuttings.

## DURANTA PLUMIERI Jacq.

FAM.—Verbenaceæ.

An erect spiny bushy shrub, a native of S. America. Leaves oblong-lanceolate; flowers blue borne in great profusion in racemes, succeeded by orange coloured berries. In bloom throughout the year and makes a good hedge. There is a variety *alba* with white flowes.

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## ERANTHEMUM BICOLOR Schr.

FAM.—Acanthaceæ.

A small shrub, with dark green ovate leaves; flowers white with lowest petals purple. A native of Philippine Islands. Very beautiful when in full blossom during hot and rainy seasons. Propagated by cuttings.

There are several varieties of Eranthemum grown in Gardens.

## EUPHORBIA SPLENDENS Boj.

FAM.—Euphorbiaceæ.

A shrub, a native of Madagascar, with much branched stem and numerous long, straight sharp thorns; flowers scarlet, showy in dichotonous cymes. Grown in gardens. It is grown as a hedge at Coonoor.

## FORTUNELLA JAPONICA (Thumb) Swingle.

FAM.—Rutaceæ.

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COM. NS. :—*E.* Round Kamquot, Chinese orange.

A much branched spiny shrub. It has dense green foliage and numerous, small, bright golden coloured fruits which makes the plant very ornamental. Cultivated in gardens and hedges. Propagated by seeds or layers. East Asiatic.

*See* Fruit Trees.

## FUCHSIA (Plum.) L.

FAM.—Onagraceæ.

Beautiful flowering small shrubs, with entire leaves and flowers with four brightly coloured petals. They are in bloom from April onwards. They grow well at hill stations like Mahabaleshwar and Panchgani but are a failure on the plains. There are a number of species and varieties in cultivation. Propagated by cuttings or suckers. Central and S. America; New Zealand.

### GALPHIMIA GLAUCA Cau.

FAM.—Malpighiaceæ.

A small shrub of upright habit; leaves opposite, entire; flowers bright yellow in small racemes terminating the branches. In bloom August-February. It makes an excellent internal fence. Propagated by seeds. Tropical American.

### GARDENIA FLORIDA Linn.

### (GARDENIA JASMINOIDES Ellis).

FAM.—Rubiaceæ.

COM. NS. :—*E*. Cape Jasmine; *M*. Gandharaj.

A most delightful shrub; a native of china but common in Indian gardens. It has handsome glossy leaves and bears during rains, very double, cream-white, very fragrant flowers. Propagated by cuttings. Palaeo-tropical.

### GARDENIA LUCIDA Roxb.

FAM.—Rutaceæ.

COM. NS. :—*M*. Dikemali.

A large shrub with rich noble foliage; leaves bright shining, olive-green, large; bears during March-June large handsome, solitary, fragrant, white, flowers, Propagated by cuttings. Palaeo-tropical

*See*.

### HAMELIA PATENS Jacq.

FAM.—Rutaceæ.

A shrub about 2 m. high, a native of Tropical America. It has dense rich green foilage of elliptic — lanceolate strongly nerved leaves. Flowers scarlet and yellow, with a long tube and short-lobes, in terminal cymes. Propagated by cuttings.

### HELICONIA ANGUSTIFOLIA Hook.

FAM.—Musaceæ.

An ornamental plant, a native of Brazil. Leaves with long petioles, gracefully arching; flowers white with greenish tips; bracts lanceolate, scarlet. Propagated by division.

### HELICONIA BIHAI Linn.

FAM.—Musaceæ.

A tall plant, about 4 m. high, a native of the W. Indies. It has ovate-lanceolate leaves with long petioles and red or orange bracts enclosing the flowers. Propagated by division.

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### HELICONIA METALLICA Plnach.

FAM.—Musaceæ.

An ornamental plant, a native of New Guinnea. Leaves elegantly drooping and recurved, broadly lanceolate, the underside, midrib, margins and curving veins of a dark bronzy-red, flowers scarlet. Proparated by division.

### HELIOTROPIUM PERUVIANUM Linn.

FAM.—Boraginaceæ.

COM. NS. :—*E.* Cherry Pie, Heliotrope.
A small shrub, a native of Peru. It produces abundant fragrant flowers, verying in colour from white to dark-purple. Propagated by cuttings. It thrives well at high altitudes.

### HIBISCUS MUTABILIS Linn.

FAM.—Malvaceæ.

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COM. NS. :—*E.* Changeable Rose.

A large bushy shrub with cordate, more or less lobed leaves; flowers large with spreading corolla, white or pink in the morning, turning red before night. A native of China, cultivated in gardens.

*See* Fibres.

### HIBISCUS ROSA-SINENSIS Linn.

FAM.—Malvaceæ.

COM. NS. :—*E.* Shoe flower; *M.* Jaswand.

A perennial shrub; flowers solitary, axillray, large, tubular red. There are single and double forms, with different colour shades, orange, yellow, crimson, bright-red, magenta. Flowers most of the year. Probably Chinese.

*See* Medicinal Plants, Fibres, Sacred Plants.

## HIBISCUS SCHIZOPETALUS Hook F.

FAM.—Malvaceæ.

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An attractive large shrub, a native of E. Africa. The flowers are pendulous with recurved fringed petals of deep orange-red colour, and a long slender style, projecting beyong the corolla. Cultivated in gardens.

## HIBISCUS SYRIACUS Linn.

FAM.—Malvaceæ.

A bushy shrub, about 1·75 m. high. Leaves lower ovate, upper more or less 3 lobed. Flowers lilac-blue with dark purple eye. Cultivated as an ornamental plant all over the State.

All the *Hibiscus* species are propagated by cuttings.

## HOLMSKIOLDIA SANGUINEA Retz.

FAM.—Verbenaceæ.

A straggling shrub, a native of subtropical Himalayas, about 2·25 m. high; bears very curious flowers, remarkable for their large campanulate red calyx, about 2·5 cm. in diameter. When in profusion it is a most beautiful plant. Propagated by cuttings or seeds.

## IPOMOEA CARNEA Jacq.

FAM.—Convolvulaceæ.

An suberect shrub about 2 m. high, a native of S. America. Flowers showy, pale-rose coloured, with a long tube. Cultivated in the gardens.

## IPOMOEA COCCINEA Manch.

FAM.—Convolvulaceæ.

A subscandent shrub with weak stem. It has ovate-cordate leaves and lax cymes of crimson flowers.

## IXORA COCCINEA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*M*. Bakora.

A shrub about a m. high. Leave oblong; flowers numerous, bright-scarlet, in dense cymes. Flowers more or less throughout the year. A handsome shrub. Common in Konkan; Grown in gardens also. Tropical.

*See* Medicinal Plants.

## JACQUINIA RUSCIFOLIA Jacq.

FAM.—Theophrastaceæ.

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A shrub of dense habit, having narrow lance-shaped leaves, ending in a short point and bearing small, starlike, bright orange, pretty flowers. Propagated by seed. Tropical America.

## JASMINUM GRANDIFLORUM Linn.

FAM.—Oleaceæ.

COM. NS. :—*M.* Chameli, Jati-jai.

A large sub-scandent shrub, a native of N. W. Himalayas. Leaves pinnate; flowers rather large, white, reddish underneath. Cultivated in gardens.

*See* Medicinal Plants, Oils.

## JASMINUM HUMILE Linn.

FAM.—Oleaceæ.

COM. NS. :—*M.* Hemapuspika.

An erect rigid shrub. Leaves are trifoliate or pinnate, the branches angular and the flowers yellow. Cultivated in gardens. Himalayan.

## JASMINUM PUBESCENS Willd.

FAM.—Oleaceæ.

COM. NS. :—*M.* Ran-mogara.

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A scandent shrub. Leaves opposite; flowers white, lobes or corolla 6-9, in dense capitate cymes. Flowers December-February. Wild in Konkan, S. M. Country and Kanara.

## JASMINUM SAMBAC Ait.

FAM.—Oleaceæ.

COM. NS. :—*E.* Sambæ, Tuscan Jasmina; *G.* Magro; *H.* Motia, *M.* Mogara.

A sub-erect shrub. Leaves opposite, variable in shape usually ovate or elliptic; flowers white very fragrant, solitary or usually in 3-flowered cymes; Flowers in hot season; widely cultivated all over the State. Propagated by cuttings.

This is known as the Arabian or Tuscan Jasmina.

*See* Medicinal Plants, Oils.

## JATROPHA MULTIFIDA Linn.

FAM.—Euphorbiaceæ.

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COM. NS. :—*E*. Coral Plant.

A shrub, a native of America. It has orbicular large leaves, palmately cut into many narrow segments; flowers scarlet, cultivated in gardens.

*See* Poisonous Plants and Fish Poisons.

## JATROPHA PODAGRICA Hook.

FAM.—Euphorbiaceæ.

A small shrub with a curious grouty stem. Leaves peltate; flowers small, bright red. Often grown in conservatories. Tropical.

## JUSTICIA GENDARUSSA Burn.

FAM.—Acanthaceæ.

COM. NS. :—*M*. Jagat-madan.

A strong scented small plant of purple hue; very common in gardens as an edge plant in shady positions. Tropical.

## KENTIA WENDLANDIANA F. Muell.

FAM.—Palmaeæ.

A small handsome palm; in general appearance do not much differ from *Areca* palm. It is good for conservatories. Moluccas.

## LAGERSTRAEMIA INDICA Linn.

FAM.—Lythraceæ.

COM. NS. :—*M*. Chinai-mendi.

A very handsome shrub, a native of China, leaves 5 cm. long, smooth, and showy flowers of every shade from pale rose to dark crimson. Flowers June-July. Propagated by cuttings or seed.

## LANTANA GAMARA Linn.

FAM.—Verbenaceæ.

COM. NS. :—*M*. Ghaneri, Tantani.

A straggling shrub with recurved prickles on the branches, and orange-coloured flowers. A native of Tropical America. Introduced as an ornamental plant but has run wild all over the State. Used as a fence. Flowers more or less throughout the year. Recently cross-breed varieties with flowers varying from pure-white to dark-crimson have been introduced into gardens.

### LAWSONIA INERMIS L.

Fam.—Lythraceæ.

COM. NS. :—*E.* Henna plant; *M.* Mendi.

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A much branched spiny shrub. Leaves opposite; flowers in terminal, pyramidal and panicled cymes, many fragrant, white or rose coloured flowers. Flowers April-July. Wild in hedges near the sea-coast. Planted as a hedge in gardens.

### LIPPIA CITRIODORA H. B. & K.

Fam.—Verbenaceæ.

COM. NS. :—*E.* Lemon-scented verbena.

A graceful shrub with pale-green lanceolate, sweetly scented leaves, and small whitish or lilac flowers in terminal panicles. It is a native of S. America. It is very common in gardens and is much esteemed for its fragrant leaves. Propagated by cuttings.

### LOBELIA NICOTIANAEFOLIA Heyne.

Fam.—Lobeliaceæ.

COM. NS. :—*M.* Dhaval.

A very large biennial or perennial, stem hollow 1-3 m. high. Leaves oblong lanceolate, lower longer, upper very short. Flowers white with 3 linear lobes in terminal racemes more than 30 cm. to 1 m. long. The flower tassel looks pretty. Flowers Nov.-May. Propagated by seeds.

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*See* Medicinal Plants, Narcotics, Poisonous Plants and Fish poisons.

### MAGNOLIA PUMILA Andr.

Fam.—Magnoliaceæ.

A small shrub with oblong leaves; flowers globular, white, very sweet-scented. Rather shade loving. Propagated by guti.

### MARTYNIA DIANDRA Glox.

Fam.—Pedaliaceæ.

COM. NS. :—*M.* Vinchvi.

A very small shrub, a native of Mexico. Leaves large, cordate, lobed, covered with a sticky secretion. Flowers, handsome, rose-coloured in racemes. Fruit with 2 long curved horns. Found on rubbish heaps and waste places. Worth growing in gardens.

### MELASTOMA MALABATHRICA Linn.

FAM.—Melastomaceæ.

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COM. NS. :—*M.* Lakheri, Palore.

A much branched shrub. Leaves oblong, rigid, rather hairy; flowers bright-purple, showy, rather large, produced in copious terminal panicles. Wild in moist forests in Konkan and N. Kanara. Rarely met with in the gardens; this should be grown on a larger scale as an ornamental plant. Flowers Oct.-Mar. Propagated by seeds with difficulty.

*See* Fruit Trees.

### MUSA COCCINEA Andr.

FAM.—Musaceæ.

A plant with slender cylindrical stem about 1·3 m. high. Leaves oblong, about a m. long and spikes of flowers enclosed in bright scarlet bracts. A native of South China. Grown in gardens as an ornamental plant.

### MUSA SUMATRANA Beec.

FAM.—Musaceæ.

A plant with cylindric stem about 2·5 m. high. Leaves large with irregular blotches of scarlet-brown. A native of Sumatra. Grown in conservatories as an ornamental plant.

### MUSA ZEBRINA Van Houtte.

FAM.—Musaceæ.

A plant with cylindric stem 1·75–3·25 m. high. Leaves oblong-lanceolate, green, striped with dark bands above, red beneath, a native of the Malay Peninsula. Grown as an ornamental plant in gardens.

### MUSSAENDA FRONDOSA Linn.

FAM.—Rubiaceæ.

COM. NS. :—*M.* Bhutkes.

A rambling shrub. Leaves broadly-elliptic; flowers deep golden-yellow tubular with one of the Calyx lobes developed into a petaloid structure, creamy-white, which forms the ornamental character of the plant. Flowers July-Oct.; Wild in hills and in moist forests. Grown in gardens. Propagated by cuttings and seeds.

### MYRTUS COMMUNIS Linn.

FAM.—Myrtaceæ.

COM. NS. :—*E.* Myrtle; *M.* Matli, Malati.

A small shrub. Leaves small ovate, very sweet smelling; flowers, small, solitary, white. Grown in gardens. Mediterranean.

*See* **Medicinal Plants, Oils.**

### NERIUM ODORUM Soland.

FAM.—Apocynaceæ.

COM. NS. :—*E.* Oleander; *M.* Kanher.

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A large evergreen shrub with milky juice. Leaves in threes linear-lanceolate; dark-green and shining above; flowers funnel shaped, red, rose or white, fragrant, single or double. Flowers more or less throughout the year; grows wild along the banks of rivers; planted in gardens; also as a hedge plant.

*See* Medicinal Plants, Poisonous Plants and Fish Poisons, Sacred Plants.

### OSMANTHUS FRAGRANS Lour.

FAM.—Oleaceæ.

A shrub with coriaceous leaves. The flowers are small, white delightfully fragrant produced in dense bunches, a native of China and Japan. Largely grown in gardens in the State where it flowers abundantly during the cold season. Propagated by layers.

### PANAX COCHLEATUM D. C.

FAM.—Araliaceæ.

COM. NS. :—*E.* Shell-leaved Panax.

A shrub with long simple concave leaves like oyster-shell. A native of the Eastern Islands. Very common as a foliage plant in gardens.

### PANAX FRUTICOSUM Linn.

FAM.—Araliaceæ.

An elegant shrub, a native of Eastern Islands, with much divided leaves. It is of special use in dinner-table decoration.

Many other Panax species are, now a days, grown in the gardens for their foliage.

### PANDANUS CANDELABRUM Beauv. Var. Variegata.

FAM.—Pandanaceæ.

A small shrub, a native of Java, leaves 1-2 m. long, 10 cm. broad, gradually tapering to a fine point, margins spiny; colour is bright green with bands of white extending from the base to the apex. It is a plant of great beauty and is very ornamental in an isolated position.

### PEDILANTHUS TITHIMALOIDES Poit.

FAM.—Euphorbiaceæ.

COM. NS. :—*M.* Vilayati-sher.

A succulent shrub, about a meter high, a native of S. America, with fleshy leaves and a scarlet slipper-shaped ring of bracts surrounding the flowers suitable for edging. Propagated by cuttings.

### PELARGONIUM L' Herit.

FAM.—Geraniaceæ.

COM. NS. :—*E.* Garden Geranium.

A small shrub. Leaves nearly circular, soft, velvety, having large blunt teeth on the margins; flowers showy, varying from white to intense scarlet. Numerous garden varieties are grown.

Propagated mostly by cuttings, and also from seeds.

### PENTAS CARNEA Benth.

FAM.—Rubiaceæ.

A shrubby plant about 30 cm. high. It bears a constant succession of flowers of a delicate lavender colour in large corymbs. A truly beautiful plant. Propagated by slips or seeds. Africa, Madagascar.

### PLUMBAGO CAPENSIS Thunb.

FAM.—Plumbaginaceæ.

COM. NS. :—*M.* Kala-chitrak.

A small shrub, a native of S. Africa. Leaves lanceolate arranged in succession of whorls; flowers with tubular calyx, pale-blue. They bloom in profusion during hot and rainy seasons. Grown in gardens. Propagated by cuttings or layering.

### PLUMBAGO ROSEA Linn.

FAM.—Plumbaginaceæ.

COM. NS. :—*E.* Fire-plant; *M.* Lal-chitrak.

A shrub, 60-90 cm. high; stem erect. Leaves large oblong; flowers tubular, rosy-scarlet in lax spikes; Flowers throughout the year. A native of Sikkim and Khasia hills. Cultivated in gardens.

*See* Medicinal Plants.

### PLUMBAGO ZEYLANICA Linn.

FAM.—Plumbaginaceæ.

COM. NS. :—*M.* Chitrak.

A perennial, woody, subscandent herb. Leaves thin, ovate; flowers white in elongate spikes; flowers Aug.-Sept. Wild in shady and rocky places in Konkan and Deccan hills. Cultivated in gardens as an ornamental plant. Propagated by seeds and cuttings.

*See* Medicinal Plants.

### POGOSTEMON PATCHOULY Pell Benth.

FAM.—Labiatæ.

COM. NS. :—*E.* Patchouly Plant; *M.* Pach.

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A small shrub with stem and branches quadrangular. It is of no interest in the garden, but for the peculiar strong fragrance of its leaves. Propagated by cuttings. Indo-Malayan.

### POINSETTIA PULCHERRIMA R. Grah.

FAM.—Euphorbiaceæ.

A rapid growing shrub, with slender woody branches, naked below; a native of America. It has small flowers surrounded by large floral leaves, brightly coloured, crimson or occasionally yellowish-white; flowers in the cold season. Propagated by cuttings.

### PTYCOSPERMA ELEGANS Blume.

FAM.—Palmeæ.

A small palm; stem smooth, ringed; shoots from the base. Leaves feather-like. Cultivated in gardens. Indo-Malayan.

### RHAPIS FLABELLIFORMIS.

FAM.—Palmeæ.

A small Chinese palm. Leaves small, fan-shaped, divided to the base into about nine linear segments, abruptly cut off at the ends. Sends up numerous stems useful for decoration. Propagated by division.

### RAUWOLFIA CANESCENS Linn.

FAM.—Apocynaceæ.

A small shrub with whorled ovate-oblong leaves; flowers small white and the drupes (fruits) are dark-red. A native of the W. Indies. Occasionally grown in gardens. Propagated by seeds.

### RAUWOLFIA SERPENTINA Benth.

FAM.—Apocynaceæ.

COM. NS. :—M. Hadki, Sarpagandha.

A small erect shrub. Leaves lanceolate in whorls; flowers white, often tinged with violet; fruits purplish-black when ripe. Flowers Mar.-May. Common in N. and S. Konkan and N. Kanara in moist forests. Tropical. The inflorescence of this plant with red pedicels and calyx and white corolla is striking.

Few shrubs are more elegant, especially when the vivid carmine of the perianth is contrasted not only with the milk-white corolla, but with the rich-green berries which at the same time embellish the fascicle (Sir W. Jones).

*See* Medicinal Plants.

### REINWARDTIA TRIGYNA Planch.

FAM.—Linaceæ.

COM. NS. :—*M.* Abai, Basantee.

An undershrub about a meter high. Flowers large orange-yellow; when in blossom in cold season it is a most showy plant, with its profusion of flowers. Propagated by the division of roots. N. India.

### RONDELETIA ODORATA Jacq.

FAM.—Rubiaceæ.

A hardwooded shrub, a native of Mexico. It has ovate, acute leaves on very short stalks and scarlet or orange coloured fragrant flowers. Propagated by layers.

### ROSE DAMASCENA Mill.

FAM.—Rosaceæ.

COM. NS. :—*E.* Bussora rose; *M.* Gulab.

A perennial shrub, 1·5 m. high; stems with stout, hooked prickles; flowers fragrant, usually corymbose, double, red, pink or white, sometimes striped. Flowers all the year round. Cultivated in gardens all over. Propagated by cuttings.

Several varieties of roses, with different sizes and different shades are cultivated in gardens.

*See* Medicinal Plants, Oils.

### RUELLIA BAIKIEI Gard.

FAM.—Acanthaceæ.

An undershrub, a native of Brazil. Leaves wavy, oblong, pointed. It produces racemes of trumpet-shaped scarlet flowers about 5 cm. long from Sept.-April. Grown in gardens. Propagated by cuttings.

### RUSSELIA JUNCEA Zuce.

FAM.—Scrophulariaceæ.

A handsome bushy plant, 1-1·25 m. high, with long rush-like stems and bright scarlet tubu'ar-flowers which bloom throughout the year. A native of Mexico. It is easly propagated; every part of it that touches the ground during the rainy season takes root.

## RUSSELIA ROTUNDIFOLIA Cav.

FAM.—Scrophulariaceæ.

A showy plant, a native of Mexico. It has sub-orbicular, cordate leaves and scarlet flowers in racemes.

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## RUTA GRAVEOLENS Linn.

FAM.—Rutaceæ.

COM. NS. :—*M.* Satap.

A strongly smelling shrub. Leaves decompound ; flowers yellowish in spreading corymbs. It forms a pleasing variety amongst other pot-plants. Propagated by division.

*See* Medicinal Plants, Oils.

## SALVIA COCCINEA Juss.

FAM.—Labiatæ.

A slender plant ·3-1·0 m. high, with 4-angled stems ; leaves ovate, cordate or crenate ; flowers scarlet, pedicillate, in distant whorls. A native of Central America. Grown in gardens. Nearly always in bloom. Propagated by stipes or seeds.

## SALVIA FARINACEA Benth.

FAM.—Labiatæ.

A herbaceous perennial ; stems numerous in a cluster. Leaves ovate-lanceolate ; flowers violet-blue with densely white hairy calyx. A useful bedding plant flowering abundantly from Sept.-May. Propagated by seeds or slips. Tropical.

## SALVIA SPLENDENS.

FAM.—Labiatæ.

A large herbaceous plant. It has large gaping brilliant scarlet flowers with large bracts. Superb when in full blossom. Propagated by cuttings or seeds.

## SARCOSTEMMA BREVISTIGMA Wight.

FAM.—Asclepiadaceæ.

COM. NS. :—Soma.

A leafless trailing shrub ; stem more or less cylindrical green with joints 10-20 cm. long ; flowers greenish-white in many flowered terminal umbels. Flowers in June and July. Wild in stony places in Konkan, Deccan and S. M. Country. Worth growing in the rockery in the gardens.

## SERISSA FOETIDA Lamk.

FAM.—Rubiaceæ.

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A very pretty small shrub, about 60 cm. high, with very small dark-green shinning leaves; nearly always in blossom with its sparkling, double, white flowers of the size of a shirt-button. A native of China. Propagated by cuttings.

## TABERNAEMONTANA DIVARICATA R. Br.

### (Tabernaemontana Coronaria Willd.)

FAM.—Apocynaceæ.

COM. NS. :—*M.* Tagar.

A glabrous evergreen shrub. Leaves opposite, elliptic, glossy-green above, pale beneath, wavy margins. Flowers snow-white, double, 2-5·5 cm. across, lobes salvershaped, in 1-8 flowered cymes; fragrant at night. Flowers in the rainy season. Cultivated in gardens. Indian.

*See* Medicinal Plants, Dyes and Tans.

## TECOMA RADICANS Juss.

FAM.—Bignoniaceæ.

A shruby plant with red-trumpet, shaped flowers apt to produce long trailing branches when grown in rich soil. Climbs like Ivy Leaves bipinnate, graceful. Constantly in blossom. Propagated by cuttings. Tropical.

## TECOMA STANS Juss.

FAM.—Bignoniaceæ.

A tall graceful shrub, with pinnate leaves. Flowers moderately large, showy, funnel-shaped, golden-yellow, in clusters. Very beautiful when in bloom. It is useful as a screen in the gardens Tropical.

## THEVETIA NERIFOLIA Juss.

FAM.—Apocynaceæ.

COM. NS. :—*M.* Bitti, Pivali-kanher.

A large evergreen shrub. Leaves oliander-like, long, linear bright-green. Flowers rather large, yellow, tubular-funnel-shaped Planted in gardens as an ornamental plant or as a hedge. There is a variety with pinkish flowers. Native of South America.

*See* Medicinal Plants, Oils, Poisonous Plants and Fish Poisons.

### THUJA ORIENTALIS L.

FAM.—Linaceæ.

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A moderate-sized shrub with exquisitely beautiful foliage. It forms a large spreading bush when it has room to spread. Propagated by cuttings or seeds.

### THUNBERGIA ERECTA T. Anders.

### (Meyenia Erecta Benth.)

FAM. :—Acanthaceæ.

A hardy shrub about 2 m. high. Leaves ovate with a blunt tooth on each margin towards the upper-part. Flowers tubular, lobes purple tube pale yellow. Propagated by layers and cuttings. There is a variety with white flowers. Tropics.

### VINCA ROSEA Linn.

FAM. :—Apocynaceæ.

COM. NS. :—*E.* Periwinkle. *M.* Sadaphuli.

An undershrub with obovate leaves and showy rosy or white flowers. Flowers all the year round. Propagated by seeds. Spreads freely when once introduced into the garden. W. Asiatic.

### WOODFORDIA FRUITICOSA Kurz.

### (WOODFORDIA FLORIBUNDA Salisb.)

FAM.—Lythraceæ.

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COM. NS. :—*M.* Dhayati.

A large deciduous straggling shrub. Leaves large ovate lanceolate, velvety above. Flowers small, numerous, scarlet, in 2-15 flowered cymes, flowers December-May. Wild throughout the State in monsoon forests. Occasionally grown in gardens, looks pretty when in bloom. Indian.

*See*—Medicinal Plants, Dyes and Tans, Fodder Plants.

### YUCCA GLORIOSA Linn.

FAM. —Liliaceæ.

COM. NS. :—*M.* Yucca.

A magnificent aloe-like plant with lanceolate, sharp pointed leaves and bearing during the rainy season a large panicle of creamy-white flowers as large as a hen's egg. Propagated by off-sets. Mexico.

*See*—Fibres.

## TREES

### ABROMA AUGUSTA Linn.

FAM.—Sterculiaceæ.

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COM. NS. :—*E.* Devil's Cotton; *M.* Ulat-kumbal.

A small tree with velvety branches, large cordate leaves and large dark-red flowers. Propagated by seeds or cuttings. Indigenous.

*See*—Medicinal Plants, Fibres.

### ADENANTHERA PAVONIA Linn.

FAM.—Mimosaceæ.

COM. NS. :—*E.* Red-wood; *M.* Mothi-gunja.

A large forest tree with bipinnate leaves, which forms a handsome bush when well pruned, bearing spikes of small yellow flowers from March to May. Raised from seeds. Indian and Tropical.

*See*—Timbers, Oils, Dyes and Tans, Gums & Resins.

### ALBIZZIA LEBBEK Benth.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Shirish.

A tall deciduous tree growing throughout the State in dry and moist forests; it is cultivated in gardens for its handsome, graceful foliage and whitish, sweet-scented flowers; more suited for road-side planting than in the gardens. Propagated from seeds. Tropical and sub-tropical Asia and Africa; usually planted.

*See*—Medicinal Plants, Timbers, Oils, Dyes & Tans, and Fodder Plants, Sacred Plants.

### ALSTONIA SCHOLARIS R. Br.

FAM.—Apocynaceæ.

COM. NS. :—*E.* Dita-bark Tree; *M.* Satwin.

A tall evergreen tree with whorled shining leaves; usually found in monsoon forests but is a good ornamental tree suitable on lawns. Propagated by seeds or cuttings. Indo-Malayan.

*See*—Medicinal Plants, Timbers.

### AMOORA ROHITUKA W. & A.

FAM.—Meliaceæ.

COM. NS. :—*M.* Rohitak.

A large evergreen tree with straight trunk. Fairly common in the evergreen forests. Planted in gardens for its handsome foliage. Propagated by seeds. Indo-Malayan.

*See*—Timbers, Oils.

### ANTHOCEPHALUS CADAMBA Miq.

FAM.—Rubiaceæ.

COM. NS. :—*M.* Kadamb.

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A large deciduous tree; with erect trunk and widely spreading horizontal branches, and orange-coloured, scented flowers in globose heads. Common near villages throughout the Konkan; planted in gardens for its foliage. Malayan.

*See*—Medicinal Plants, Timbers, Fodder Plants, Sacred Plants.

### ARAUCARIA COOKII R. Br.

FAM.—Pinaceæ.

A very handsome species with graceful feathery branches. A native of New Caledonia, Propagated by seeds.

### ARAUCARIA EXCELSA R. Br.

FAM.—Pinaceæ.

NAME NS. :—*E.* A Norforlk Island Pine.

A very handsome species with graceful feathery branches. A native of Norforlk Island. Propagated by seeds.

### ARAUCARIA CONNINGHAMII Sweet.

FAM.—Coniferæ.

A large tree of rapid growth with whorls of branches often a meter apart. Foliage is more cypress-like. A native of Queensland.

### ARECA CATECHU Linn.

FAM.—Palmaceæ.

COM. NS. :—*E.* Betel-nut Palm; *M.* Supari.

A most beautiful and elegant tall palm tree, with smooth, straight, slender, cylindrical stem, crowned by feathery leaves. In the gardens it is grown as an ornamental tree; but is cultivated in high rainfall tracts. N. Kanara, Konkan, for the nuts. Indo-Malayan.

*See*—Medicinal Plants, Timbers, Fibres, Fruit Trees, Sacred Plants.

### ARENGA SACCHARIFERA Libik.

FAM.—Palmæ.

A beautiful and magnificent tall palm, with large dark-green shining leaves, 7-8 meters long, which take a graceful plume-like curve towards the summit. It is a native of Assam, Burma and Malay Islands.

### ARTOCARPUS INCISA Linn.

FAM.—Moraceæ.

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COM. NS. :—*E.* Bread-Fruit Tree.

A middle—sized tree, a native of the Pacific Islands; leaves deeply pinnati-fid in the upper part. Fruits muricated. It is ornamental in places having humid atmosphere and equable temperature (Sea-coast). Propagated by suckers.

### AVERRHOA BILIMBI Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*E.* Cucumber Tree; *M.* Bilimbi.

A small tree, native of Moluccas. It comes into blossom about the middle of February, with pretty bunches of flowers from the trunk and branches and continues to blossom and bear fruit till the cold wheather. Propagated by seeds.

*See*—Timbers.

### AVERRHOA CARAMBOLA Linn.

FAM.—Oxalidaceæ.

COM. NS. :—*E.* Coromondal goose-berry; *M.* Kamarakh.

A small tree with close drooping branches. Very beautiful and ornamental for its foliage alone, but especially so when in full blossom, with the crowded clusters of its small, pale, rose-coloured, flowers. Propagated by seeds. Malayan.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Fruit Trees.

### BARRINGTONIA ACUTANGULA Gaertn.

FAM.—Lecythidaceæ.

COM. NS. :—*E.* Small Indian Oak; *M.* Samudraphal.

A small evergreen tree; bears pendulous racemes 30-60 cm. long of scarlet flowers. Palacotropical.

*See*—Medicinal Plants, Timbers; Dyes and Tans, Poisonous Plants and Fish Poisons.

### BARRINGTONIA RACEMOSA Blume.

FAM.—Lecythidaceæ.

COM. NS. :—*M.* Niwar.

A moderate-sized evergreen tree; bears very abundant racemes of pink flowers.

*See*—Timbers.

Both the above species are suitable for planting on banks of streams and tanks; Palaeotropical.

## BAUHINIA PURPUREA Linn.

FAM.—Caesalpiniaceæ

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COM. NS. :—*M.* Deva-kanchan, Rakta-kanchan.

An erect small tree with fragrant flowers of white, rose or purple colour, in terminal and axillary corymbose racemes; in bloom from September-November; cultivated in gardens; also found wild in dry forests of the Konkan and Deccan. Propagated by seeds, Tropical.

*See* Timbers, Fibres, Dyes and Tans, Gums and Resins, Fodder Plants.

## BAUHINIA VARIEGATA Linn.

FAM.—Caecalpiniaceæ.

COM. NS. :—*M.* Kanchan, Kovidar.

A middle sized tree, bearing flowers beautifully variegated with red and yellow, sometimes pure white (*var. Candida*), and flat pods which are frequently variegated with reddish-brown streaks. Cultivated in gardens and also as a roadside tree; in bloom in November. Propagated by seeds. Tropical.

*See*—Medicinal Plants, Timbers, Dyes and Tans, Gums and Resins.

## CALOPHYLLUM INOPHYLLUM Linn.

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FAM.—Guttiferæ.

COM. NS. :—*E.* Alexandrian laurel; *M.* Undi.

A tree of considerable size, commonly found near the sea-coast, a native of India. It has most noble foliage of large, polished, dark-green leaves; bears in June drooping racemes of large, white, delightfully fragrant flowers. Propagated by seeds. Palaeotropical.

*See*—Medicinal Plants, Timbers, Oils, Gums and Resins.

## CARYOTA SOBOLIFERA Wall.

FAM.—Palmæ

A palm tree with a group of stems in the manner of a bamboo and bears curious leaves of the size of a man's hand. A small clump has an ornamental effect. Indo-Malayan.

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### CARYOTA URENS Linn.

FAM.—Palmæ.

COM. NS. :—*E.* Fishtail palm ; *M.* Bherli-mad.

A very tall palm tree with bipinnate leaves. Inflorescence branched, 3-4 m. long forming a dense tassel drooping from the stout stalk. Flowers male and female. Splendid object in the garden; flowers during most of the year. Propagated by seeds. Indo-Malayan.

*See* Timbers, Fibres, Sugars, Liquors.

### CASSIA FISTULA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*E.* Indian laburnum ; *M.* Bahava.

A very beautiful tree. It is conspicuous by its bright golden flowers in long pendulous racemes and long cylindrical pendulous fruits. Found throughout the Deccan and Konkan forests. Planted as ornamental and road-side tree. Propagated by seeds. Tropical.

*See* Medicinal Plants, Timbers, Dyes and Tans, Fodder Plants, Sacred Plants.

### CASSIA GLAUCA Lamk.

FAM.—Caesalpiniaceæ.

COM. NS. :—*M.* Motha-tarwad.

A small tree with numerous branches and pinnate leaves. Flowers yellow in axillary corymbose racemes ; wild in forests of Konkan and N. Kanara. Planted in gardens. Flowers September to March. Propagated by seeds. Tropical.

### CASSIA JAVANICA Aubl.

FAM.—Caesalpiniaceæ.

A small tree, a native of Malay Islands ; bears racemes of flowers of a lovely pink or rose colour ; blossoming in hot season. Propagated by seeds. Tropical.

### CASSIA MARGINATA Roxb.

FAM.—Caesalpiniaceæ.

COM. NS. :—*M.* Urimedi.

A small tree with wide-spreading branches and graceful small-leaflet foliage ; bears racemes of small pink coloured flowers in profusion, during the rainy season. Propagated by seeds. Tropical.

*See* Timbers.

### CHLOROXYLON SWIETENIA D. C.

FAM.—Rutaceæ.

COM. NS. :—*E.* Satin-wood Tree ; *M.* Haldu.

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A moderate-sized deciduous tree ; leaves pinnate. Flowers white, small, on long pedicels, forming large, branched panicles ; in bloom in March-April. Common on the Satpudas and the drier parts of the Bombay State. Ornamental foliage tree. Propagated by seeds. East-Indian.

### CHRYSOPHYLLUM CAINITO Linn.

FAM.—Sapotaceæ.

A fruit tree of considerable size, but grown occasionally as an ornamental shrub ; leaves are large and laural-like, with upper surface glossy dark green, and under surface of golden hue. When the leaves are set in motion by the wind the golden-hue contrasts very beautifully with the dark-green colour. Tropical.

### CHUKRASIA TABULARIS A. Juss.

FAM.—Meliaceæ.

COM. NS. :—*E.* Chitagong wood ; *M.* Lal-devdari.

A large tree with pinnate long leaves. Flowers yellowish-white in terminal panicles. Flowering in Feb.-April. A fine foliage tree. Propagated by seeds. Indo-Malayan.

*See* Timbers, Dyes and Tans.

### CORDIA SEBESTENA Linn.

FAM.—Boraginaceæ.

A small tree, a native of Cuba, with rough ovate or elliptic leaves 10-15 cm. long, and abundant large cymes of showy scarlet flowers ; flowering Jan.-Mar. Propagated by seeds or layers. Tropical.

### CORYPHA UMBRACULIFERA Linn.

FAM.—Palmaceæ.

COM. NS. :—*E.* Fan—or Talipot Palm ; *M.* Tali.

A straight very tall majestic palm. Leaves very large with very long petioles which are spiny on margins. Produces an immense flower-branch from the top of the stem once only. It terminates the existence of the tree. Indo-Malayan.

*See* **Fibres.**

(G.C.P.) L-A Vf 1431–38 (1,000–1-61)

### CRATAEVA NURVULA Ham.

FAM.—Capparidaceæ.

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COM. NS. :—*M.* Vayavarna.

A small deciduous tree; leaves trifoliate; flowers large, white, changing to yellow and ultimately purple; often found wild on the banks of streams occasionally planted in gardens. Tropical.

*See* Medicinal Plants, Timbers.

### CUPRESSUS SEMPERVIRENS Linn.

FAM.—Pinaceæ.

COM. NS. :—*M.* Suru.

A tall tree attaining a height of about 32 m., a native of Europe. Foliage dark-green; branches few and strong forming an acute angle with the stem. Propagated generally by seeds. There is a variety with horizontal branches; with a conical outline during the first twenty years. Mediterranean.

### CUPRESSUS TORULOSA D. Don.

FAM.—Pinaceæ.

A tall tree, a native of the W. Himalayan; attaining 24 m. height. Branches whorled, forming a pyramidal crown of dark-green foliage. Cultivated in gardens. Propagated by seeds. Himalayan.

*See* Timbers.

### CYCAS REVOLUTA Thumb.

FAM.—Cycadaceæ.

A palm-like evergreen tree; stem short cylindrical, with a crown of deeply pinnate dark-green shining leaves. A native of Japan. It is at its greatest beauty when young leaves are unfolded. Propagated by suckers.

### CYCAS RUMPHII Miq.

FAM.—Cycadaceæ.

A palm-like evergreen tree of noble aspect. Leaves longer than the above species, abundant in the Malabar and Cochin forests. Propagated by suckers. Wild in Konkan and S. M. Country. Flowers in June.

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### DILLENIA INDICA Linn.

FAM.—Dilleniaceæ.

COM. NS. :—*M.* Motha karmal.

A middle sized beautiful tree of spreading habit, with bright green leaves having conspicuous nerves and large, very fragrant, pure white flowers. Propagated by seed. Indo-Malayan.

*See* Timbers.

### DILLENIA PENTAGYNA Roxb.

FAM.—Dilleniaceæ.

COM. NS. :—*M.* Karmal.

A middle-sized tree, with magnificant foliage; leaves 30 by 90 cm. (very large). Flowers yellow, fragrant, appearing before the leaves (March-April) on bear old branches. Propagated by seeds. Indo-Malayan.

*See* Timbers, Fruit Trees, Fodder Plants.

### ELAEIS GUINEENSIS Sacq.

FAM.—Palmaceæ.

COM. NS. :—*E.* Red-oil Palm.

A stately erect tall handsome palm with a stout stem and large pinnate leaves of dark-green colour. A native of W. Africa. It forms an excellent decorative plant. Propagated by seeds.

*See* Oils.

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### ERIOBOTRIGA JAPONICA Lindl.

FAM.—Rosaceæ.

COM. NS. :—*E.* Loquat.

A small tree with handsome foliage and large noble leaves a native of Japan and China. Fruits are borne in clusters.

*See* Fruit Trees.

### ERYTHRINA VARIEGATA L. *Var.* Orientalis Merr.

FAM.—Papilionaceæ.

COM. NS. :—*E.* Indian Coral Tree; *M.* Pangara.

A tall deciduous armed tree with trifoliate leaves and large bright-scarlet flowers. Flowers Feb.-Mar. Exceedingly showy when it becomes a perfect blaze with its handsome clusters of large brilliant scarlet flowers, being perfectly leafless at that time. Wild in the deciduous forests of Konkan and N. Kanara. Propagated by seeds. Tropical and subtropical.

*See* Medicinal Plants, Timbers, Fibres, Dyes and Tans, Gums and Resins, Fodder Plants.

### EUCALYPTUS CITRIODORA

FAM.—Myrtaceæ.

A handsome young tree with pleasant lemon odour from its leaves. Grown in gardens. Propagated by seeds. Native of Australia.

### EUCALYPTUS VAMINALIS

FAM.—Myrtaceæ.

A very tall straight tree with very slender stem and alternate leaves formed like a curved sword and white flowers. Grown in gardens. Propagated by seeds. Native of Australia.

### EUGENIA MALACCENSIS Linn.

FAM.—Myrtaceæ.

COM. NS. :—*M.* Malaka-jamb.

A small tree with dense racemes of large bright crimson flowers with numerous stamens. Often growing in gardens. Flowers—April and May. Tropical.

*See* Fruit Trees.

### FICUS ELASTICA Roxb.

FAM.—Moraceæ.

COM. NS. :—*E.* India Rubber Tree.

A large tree with aerial roots and large shining leaves, with large pink stipules. A native of the outer Himalayas. Planted as an ornamental tree in gardens. Tropical.

*See* Timbers, Gums and Resins.

### FILICIUM DECIPIENS Thaw.

FAM.—Sapindaceæ.

A handsome evergreen tree of compact and globular form. Foliage dark green. This is a good tree either for grouping or small avenues. Tropical Asia and Africa,

### GARCINIA SPECIES.

FAM.—Guttifereæ.

### GARCINIA INDICA Chois.

COM. NS. :—*M.* Ratambi; also cultivated in gardens for its fruit.

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### GARCINIA SPECATA Hook f.

COM. NS. :—*M.* Haldi.

### GARCINIA XANTHOCHYMUS Hook f.

COM. NS. :—*M.* Tharambi.

All the above beautiful evergreen middle-sized trees are found wild in Western ghats.

*See* Medicinal Plants, Timbers, Oils, Gums and Resins, Condiments and spices, Fruit Trees (w).

### GUAZUMA TOMENTOSA H. B. & K.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Rudrakshi.

A small tree, a native of Tropical America, with obliquely cordate leaves and showy yellow flowers in large panicles. Planted in gardens, Flowers March-August.

### HAEMATAXYLON CAMPECHIANUM Linn.

FAM.—Caesalpianiceæ.

COM. NS. :—*E.* Log-wood Tree; *M.* Patangi.

A small tree, a native of Tropical America, with abruptly pinnate leaves, and yellow fragrant flowers in thick axillary spikes. Flowers in October. Grown in the gardens as a hedge.

*See* Dyes and Tans.

### HIBISCUS TILIACEUS Linn.

FAM.—Malvaceæ.

COM. NS. :—*M.* Belapata.

A small tree; leaves cordate, roundish-ovate, flowers large in terminal racemes, yellow in the morning, turning red in the afternoon; centre-dark-crimson. Flowers in January. Found wild near the sea coast. Cultivated as an ornamental plant in gardens. Propagated by cuttings.

*See* Timbers, Fibres.

### HYPHOENE THEBAICA Mart.

FAM.—Palmaeæ.

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COM. NS. :—*E.* Doum Palm.

A palm tree about 10 m. high, native of upper Egypt, dividing into 3 or 4 branches above the middle. Leaves fan-shaped. When seen from a distance against the sky the upper part looks like letter W. There are many such trees in the public park at Baroda.

### IXORA PARVIFLORA Vahl.

FAM.—Rubiaceæ.

COM. NS. :—*E.* Torch tree ; *M.* Rai-kuda.

A small evergreen handsome tree. It bears white or pink odourous flowers, arranged in branched cymes. Throughout the state in deciduous forests.

*See* Timbers.

### IXORA COCCINEA Linn.

FAM.—Rubiaceæ.

A shrub with beautiful scarlet flowers, abounds in some parts of the Konkan ; it is also commonly planted in gardens.

*See* Medicinal Plants.

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### KIGELIA PINNATA D. C.

FAM.—Bignoniaceæ.

A handsome small tree, a native of Tropical Africa, with pinnate leaves and long pendulous racemes of dull liver-coloured flowers which appear in the hot season. Propagated by seed.

*See* Timbers.

### KLEINHOVIA HOSPITA Linn.

FAM.—Sterculiaceæ.

A small handsome tree with straight trunk. Leaves, broad cordate or ovate ; flowers pink or rose, slightly fragrant, numerous, arranged in large cymose panicles. Flowers—end of rainy season. Planted throughout the State.

*See* Timbers.

### KYDIA CALYCINA Roxb.

FAM.—Malvaceæ.

COM. NS. :—*M.* Ranbhendi, Warung.

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A small tree with young parts velvety. Leaves more or less deeply lobed. Flowers, white, pink or sometime pale-yellow, with 5 lobes. Flowers. July-Oct. Common in the deciduous forests of Ghats of Konkan and N. Kanara.

*See* Timbers, Fibres, Fodder Plants.

### LAGERSTROEMIA SPECIOSA Pers.

**(Lagerstroemia flos-reginae Retz.)**

FAM.—Lythraceæ.

COM. NS. :—*M.* Motha-bondara, Taman.

A large tree with widely spreading branches. Leaves large, elliptic or oblong-lanceolate. Flowers large, purple in long panicles. Flowers April-June. Wild in Konkan and N. Kanara; sometimes grown as an ornamental plant.

*See* Medicinal Plants. Timbers.

### LIVISTONA CHINENSIS R. Br.

FAM.—Palmaeæ.

A handsome palm, a native of China and Japan, with stout trunk, 7-10 m. high and fan-shaped leaves with long hanging bi-partite divisions; petioles long, spiny; flowers white; fruit-bearing bunch nodding, commonly grown in gardens.

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### MAGNOLIA GRANDIFLORA

FAM.—Magnoliaceæ.

COM. NS. :—*M.* Kavthi-chapha.

A small tree, a native of Carolina; noted for the beauty of its noble laurel-like leaves; flowers very large, white, fragrant, looking like hen's egg from a distance when in bud. Rather shade loving. Propagated by gutty (grafts).

### MELOCHIA UMBELLATA Stapf.

**(Melochia Velutina Bedd.)**

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Methuri.

A small ornamental tree. Leaves broadly ovate, 15 × 18 cm.; velvety on both sides when young; flowers small, pale-pink in many

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flowered panicles. Flowers Nov., widely planted throughout the State in gardens. The silvery pubescens which clothes the young shoots and leaves adds valuable scenic effect.

*See* Timbers, Fibres.

### MESUA FERREA Linn.

FAM.—Guttiferæ.

COM. NS. :—*M.* Nag-champa.

A large evergreen tree. Leaves opposite, leathery, lance-shaped, drooping; flowers large, pure white, fragrant, solitary or in pairs. Flowers—Feb.-March. Throughout the evergreen rain-forests. Cultivated in gardens and near temples for its flowers.

*See* Medicinal Plants, Timbers, Oils, Gums and Resins, Fruit Trees, (w), Sacred Plants.

### MICHELIA CHAMPACA Linn.

FAM.—Magnoliaceæ.

COM. NS. :—*E.* Golden-champha; *M.* Sona-Chapha.

A large evergreen tree. Leaves large, ovate, wavy; flowers strongly scented, yellow or orange, with 15-20 perianth leaves. Flowers practically all the year round. Wild in other parts of India, cultivated in Bombay State.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans.

### MILLINGTONIA HORTENSIS Linn.

FAM.—Bignoniaceæ.

COM. NS. :—*E.* Indian Cork Tree; *M.* Akashnim.

A very tall handsome fast growing tree. Leaves opposite, decompound; flowers many, long, pure white, fragrant, in simple panicles. Flowers Sept.-Dec. Cultivated along roadsides and parks. Propagated by suckers from the roots.

*See* Timbers.

### MIMUSOPS ELENGI Linn.

FAM.—Sapotaceæ.

COM. NS. :—*M.* Bakul.

A large evergreen tree, head compact, leafy. Leaves smooth, shining; flowers whitish, very fragrant, small in fascicles of 2-8 drooping tawny pedicels. Flowers Jan.-Apr. Common in the ever-

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green forests of the Konkan and N. Kanara. Often planted in gardens for its flowers. Propagated by seeds.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans, Fruit Trees, Gums and Resins, Poisonous Plants and Fish Poisons.

### MIMUSOPS HEXANDRA Roxb.

FAM.—Sapotaceæ.

COM. NS. :—*M.* Khirni.

An evergreen ornamental tree. Head shady, trunk erect. Leaves ovate-oblong shining above; flowers white and yellow. Flowers Oct.-Dec. Common in the dry forests, all over the State.

*See* Oils, Fruit Trees, Fodder Plants.

### MIMUSOPS KAUKI Linn.

FAM.—Sapotaceæ.

COM. NS. :—*M.* Kauki, Khirni.

A beautiful evergreen tree; branches many, spreading horizontally. Leaves clustered at the ends of branches, dark green, shining above, white beneath; flowers white with a purple tinge, small. flowers, hot season. Cultivated in the State.

*See* Timbers.

### MURRAYA PANICULATA Jack.

(Murraya Exotica Linn.)

FAM.—Rutaceæ.

COM. NS. :—*M.* Kunti.

A small evergreen tree. Leaves imparipinnate, dark green, shining; flowers white, bell shaped, very fragrant. Flowers June-Oct. Pretty common on the higher ghats. Grown in gardens at a hedge. Propagated by layerings and cuttings.

*See* Timbers.

### MUSA ENSETE J. F. Gmel.

FAM.—Musaceæ.

A very large plant with cylindric stem, 10-13 m. high. Leaves oblong, very large, with red midrib; bracts large, dark scarlet brown. A native of Abyssinia, grown as an ornamental plant in gardens. Its ornamentation is large leaves with red midribs.

### NYCTANTHES ARBOR-TRITIS Linn.

FAM.—Oleaceæ.

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COM. NS. :—*E.* Coral-jasmine ; *M.* Parijataka.

A small tree rough with whitish hair. Leaves rough above; flowers small, with lobes white, tube orange coloured, fragrant. Flowers abundant July-Sept. Cultivated in gardens. Native of the Himalayas, wild in Satpudas.

*See* Medicinal Plants, Timbers, Oils, Dyes and Tans.

### OCHNA SQUARROSA Linn.

FAM.—Ochnaceæ.

COM. NS. :—*M.* Kanak-champa.

A small handsome tree. Leaves oblong-ovate, shining. Flowers, numerous, yellow on short racemes; Flowers—Feb.-April. Common in the moist forests. Cultivated on account of its flowers.

*See* Timbers, Fodder Plants.

### OCHROCARPUS LONGIFOLIUS Benth & Hook. f.

FAM.—Guttifereæ.

COM. NS. :—*M.* Surangi.

A large evergreen tree. Leaves thickly coriaceous, dark-green; flowers white, streaked with orange, fragrant, numerous. Flowers March-April. Very common in Konkan ghats. Sometimes cultivated.

*See* Timbers, Dyes and Tans,

### OREODOXA REGIA H. B. & K.

FAM.—Palmaeæ.

A fine handsome palm with pinnate leaves, about 2 m. long, a native of Cuba. It has a peculiarly bottle-shaped trunk when young. Good specimens may be seen in Victoria Gardens, Bombay and at Poona.

### PARKIA BIGLANDULOSA W. & A.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Chenduphal.

A tall handsome, tree, evergreen, a native of Africa, with bipinnate leaves, flowers in pendant globular subspherical heads; suspended on long stalks. The heads, when the flowers are in bud, are like balls of fawn-coloured velvet, but when the flowers open they become white. A fine avenue tree. Propagated by seeds. Flowers in December.

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### PARKINSONIA ACULEATA Linn.

FAM.—Caesalpiniaceæ.

COM. NS. :—*M.* Vilayati-kikar.

A small spiny tree; remarkable for the vivid polished green of its trunk and stems, with pinnate foliage of minute leaflets; flowers small, yellow, in lax racemes. Flowers January-March. A most elegant plant when in flower. Propagated by seeds.

*See* Fibres.

### PARMENTIERA CERIFERA Seem.

FAM.—Bignoniaceæ.

COM. NS. :—*E.* The Candle-Tree of Panama.

A tree, a native of Panama, bearing long straight branches with leaves of three leaflets and a winged petiole. It has pendulous waxy-looking yellow candle-shaped fruits. Flowers white or slightly rosy, pretty. Propagated by seeds.

### PELTOPHORUM FERRUGINEUM

FAM.—Caesalpiniaceæ.

A tree with fragrant yellow flowers, planted as a roadside tree and in parks and gardens. Indo-Malayan.

### PINANGA DICKSONII Blume.

FAM.—Palmaeæ.

A very slender, smooth, green-stemmed, tall palm, with pinnate forked leaves about 1·3 m. long. Spadix with 4-8 stout branches densely clothed with imbricating flowers. Common in the evergreen forests of N. Kanara.

### PITHECOLOBIUM DULCE Benth.

FAM.—Mimosaceæ.

COM. NS. :—*M.* Vilayati-chinch.

A fairly large thorny tree, a native of Mexico. Leaves green, bipinnate; pods are curiously twisted; grown as a hedge plant in gardens.

*See* Timbers, Oils, Fodder Plants.

### PLUMERIA RUBRAVAR ACUTIFOLIA **Woodson.**

FAM.—Apocynaceæ.

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COM. NS. :—*M.* Pandhara-chapha.

A small tree, a native of Tropical America, with milky juice. It has long oblong leaves only borne during rainy season. The flowers are white with golden centre, very fragrant. In full bloom (only flowers) in Feb.-April. Cultivated near villages and temples. There is a variety *rubra* with red flowers. Propagated by cuttings.

*See* Medicinal Plants, Timbers.

### POINCIANA ELATA **Linn.**

FAM.—Caesalpiniaceæ.

COM. NS. :—*M.* Sankeshwar.

An erect tree with bi-pinnate leaves. Flowers yellow with very long filaments in terminal racemes. Flowers June-Sept. Often planted in gardens and along roadside. Propagated by seeds, or cuttings. Wild in Gujarat.

### POINCIANA REGIA **Bojer.**

FAM.—Caesalpiniaceæ.

COM. NS. :—E. May-flower ; *M.* Gulmohar.

A large tree with spreading branches, a native of Madagascar. The young bi-pinnate leaves are very beautiful; flowers bright scarlet in lax racemes. Flowers April-June. Looks pretty when in full bloom. There are varieties with different shades of flower-colour. Propagated by seeds.

### POLYALTHIA LONGIFOLIA **Benth.**

FAM.—Anonaceæ.

COM. NS. :—*M.* Ashok, Asuphala.

A large evergreen elegant tree. Leaves long, narrow-lanceolate, wavy, shining above, flowers greenish, starlike. Appearing at the beginning of rains. Good as an avenue or screening tree. Propagated by seeds.

*See* Timbers, Fibres.

### PONGAMIA PINNATA Pierre.

### (Pongamia Glabra Vent.)

FAM.—Papilionaceæ.

COM. NS. :—*M.* Karanj.

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A tall almost evergreen tree with shining green leaves, and hanging racemes of lilac-rose to nearly pure-white flowers, half concealed in the leafly foliage; wild in moist situations along rivers and nalas. Often planted as a road-side tree, for which it is best suited. Indo-Malayan.

*See* Medicinal Plants, Timbers, Fibres, Oils.

### PTEROSPERMUM ACERIFOLIUM Willd.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Kanak-champa.

A tall handsome evergreen tree. Leaves large simple or lobed; flowers large, white, fragrant. Flowers in cold season. Wild in Konkan and evergreen forests of N. Kanara.

*See* Timbers.

### PTEROSPERMUM SUBERIFOLIUM Lam.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Muchkund.

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A small tree, young parts covered with buff hairs; leaves irregularly angled towards the apex, clothed with cream-coloured hairs beneath. Flowers, rather large, white, fragrant. Flowers in December. Wild in the forests of S. Konkan and Kanara. Also planted.

*See* Timbers.

### RAVENALA MADAGASCARIENSIS J. F. Gmel.

FAM.—Scitaminaceæ.

COM. NS. :—*E.* Traveller's Tree.

A very elegant tall tree, with plantain like leaves on long stalks forming a fan-like head. A native of Madagascar. The tree presents the appearance of a large open fan. It contains, even during the most arid season, a large quantity of pure fresh water in the thick ends of the leaf-stalks supplying water to the travellers. Propagated by division.

## SAGERACA LAURIFOLIA Blatt.

FAM.—Anonaceæ.

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COM. NS. :—*M.* Sageri.

A middle-sized, beautiful, ornamental laurel-like tree. Growing in evergreen forests of the Konkan, Matheran, Nagothana, Jawhar. Flowering in October-November.

*See* Timbers.

## SALMALIA MALABARICA Schott. & Endle.

**(Bombax Malabaricum)**

FAM.—Bombacaceæ.

COM. NS. :—*E.* The silk-cotton tree; *M.* Savar.

A very large thorny tree with straight trunk and horizontal branches; leaves 5-7 lobed; flowers many, large, scarlet or occasionally white. Seeds enveloped in silky fine wool. Flowers April-May, when the tree is without leaves. This presents a very beautiful sight. Common in Konkan, Gujarat and S. M. Country, Propagated by seed.

*See* Timbers, Fibres, Fodder Plants, Famine Plants.

## SAPINDUS TRIFOLIATUS Linn.

**(Sapindus Lanrifolias Vahl.)**

FAM.—Sapindaceæ.

COM. NS. :—*E.* Soap-Nut Tree; *M.* Ritha.

A large handsome tree with straight trunk and paripinnate shining green leaves; flowers many, small, dull-white in large panicles. Flowers in Feb.-April. Usually planted about villages; indigenous in the ghats in evergreen forests.

*See* Medicinal Plants, Timbers, Poisonous plants and Fish Poisons.

## SARACA INDICA Linn.

FAM.—Caesalpiniceæ

COM. NS. :—*M.* Tambada Ashok.

A handsome evergreen tree with pinnate leaves, reddish when young, shining, flowers of beautiful orange colour with coloured bracts, in large carymbs. Flowers in Aug.-Sept. Common in the western ghats and in the evergreen forests. Planted in gardens. Propagated by seeds. Tropical Asiatic.

*See* Medicinal Plants, Timbers, Sacred Plants.

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### SPATHODEA COMPANULATA Beauv.

FAM.—Bignoniaceæ.

COM. NS. :—*E.* Fountain tree; *M.* Karanj-Vriksha.

A middle sized tree with slender stem; branches bearing a crown of pinnate leaves; flowers in racemes, large, scarlet. Flowers Sept.-Nov. Cultivated in gardens or in avenues. Tropical African.

*See* Timbers.

### STERCULIA ALATA Roxb.

FAM.—Sterculiaceæ.

A handsome tall tree of Canara with straight trunk; young parts covered with golden hair. Leaves crowded at the ends of the branches.

### STERCULIA COLORATA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Kawshy.

A moderate-sized tree; leaves palmately 5-lobed crowded at the ends of branches; flowers many, deep orange-red, showy, arranged in erect panicles. Flowers, March-April, when it is the most beautiful object, appearing like red coral. Throughout the deciduous forests in the State.

*See* Fibres, Fodder Plants.

### STERCULIA GUTATA Roxb.

FAM.—Sterculiaceæ.

COM. NS. :—*M.* Golder.

A large erect tree; leaves large, shining; follicles, usually 5 obovoid; villous, of a brilliant red colour. Fruiting time—hot season. Looks very ornamental when covered with red fruits. Throughout the forests in the Konkan and N. Kanara.

*See* Timbers, Fibres.

### SYZYGIUM JAMBOS Alst.

(Eugenia Jambos Linn.)

FAM.—Myrtaceæ.

COM. NS. :—*E.* Rose-apple; *M.* Gulab-jamb.

A small tree with lanceolate, opposite leaves; flowers large greenish-white, having a great number of long white stamens; fruit sub-globose, of rich pink and white coloration, but more

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Ornamental plants.
Trees.

pleasant to the sight than taste. Flowers Feb. The plant is ornamental on account of its showy foliage, flowers and fruits. Cultivated.

*See* Medicinal Plants, Timbers, Oils, Fruit Trees.

### TERMINALIA CATAPPA Linn.

FAM.—Combretaceæ.

COM. NS. :—*M.* Deshi-Badam.

A large deciduous (in Bombay almost evergreen) handsome tree a native of the Moluccas. Branches whorled, horizontal forming table-like tiers. Leaves large, obovate, thick, crowded at the ends of branches. The leaves assume beautiful autumnal tints in cold season. Planted in gardens.

*See* Timbers, Oils, Dyes and Tans.

### THESPESIA POPULNEA Soland.

FAM.—Malvaceæ.

COM. NS. :—*E.* Tulip Tree ; *M.* Bhand.

A moderate-sized evergreen tree ; leaves cordate, leathery, with long petioles ; flowers large, pale-sulphur coloured, turning reddish. Flowers throughout the year. Attractive due to its fine foliage and large yellow flowers wild along sea-shore regions. Planted as road-side tree. Indo-Malayan.

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*See* Medicinal Plants, Timbers, Fibres, Oils, Fodder Plants. Sacred Plants.

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# APPENDIX I.

## Abbreviations used.

**Apr.**—April.
**An.**—Annual.
**Aug.**—August.
**c. ft.**—Cubic feet.
**CHAR.**—Character.
**cm.**—Centimeter.
**COM. NS.**—Common Names.
**Dec.**—December.
**DESCR.**—Description.
**Dist.**—District.
**DISTR.**—Distribution.
**E.**—English.
**Fam.**—Family.
**Feb.**—February.
**Fl.**—Flower.
**Fl. t.**—Flowering time.
**Fr.**—Fruit.
**Fr. t.**—Fruiting time.
**G.**—Gujarati.
**H.**—Hindi.
**Jan.**—January.
**K.**—Kannad.
**L.**—Leaves.
**Lin.**—Line.
**M.**—Marathi.
**m.**—Meter.
**Mar.**—March.
**Med.**—Medullary.
**N.**—North.
**Nov.**—November.
**Oct.**—October.
**S.**—South.
**Sep.**—September.
**S. M.**—Southern Maratha.
**Tr.**—Trade-name.
**Var.**—Variety.
**W.**—West.
**Wt.**—Weight.

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## APPENDIX II.

### Alphabetical List of Miscellaneous Plants of the Maharashtra State.

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